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Seeing

Guiding the Management of

Ocular Hyperemia

Red

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Ocular hyperemia, or red eye, is a common complaint of patients evaluated in a primary care clinic. The condition can be attributed to multiple causes; however, a thorough evaluation consisting of a history and focused physical examination can provide valuable clues to assist in the diagnosis of this sometimes complex problem. Some of the causes of red eye include benign reactions to an exogenous irritant, infectious conjunctivitis, trauma, or endogenous ocular insults, which may sometimes be indicative of a systemic disease.[1]

The majority of red eye cases can be managed in the primary care setting, but in some situations, immediate referral to an ophthalmologist is indicated to evaluate a potentially serious systemic disease or vision-threatening ophthalmic condition.[2] This guide will review clinical principles that are essential to history taking and physical examination for a patient with ocular hyperemia, with emphasis on key signs and symptoms that should alert the primary care provider of potentially vision-threatening ophthalmic or systemic disease.

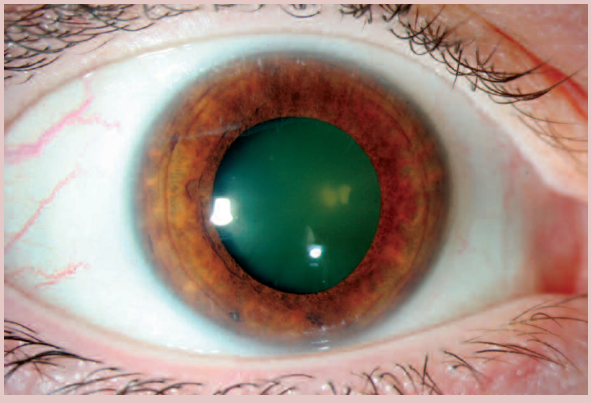
History Taking

Obtaining a complete medical history is an essential initial step in the management of red eye. After the chief complaint of a red eye is established, a directed history of present illness should be obtained to fully ascertain the problem at hand. Pertinent history may include onset and duration of the red eye, laterality, associated signs and symptoms (eye pain, visual loss, photophobia), relieving or aggravating factors, setting or context when the signs and symptoms occur, and severity of symptoms.

The chronicity of the patient's symptoms should be elicited. A chronic red eye requires referral to an ophthalmologist, as well as a red eye of acute onset with the symptoms of eye pain, diminished visual acuity, and photophobia. A chronic red eye may be caused by recurring conjunctivitis, scleritis, keratitis, or intraocular inflammation. An acute red eye is more commonly associated with a recent episode of conjunctivitis caused by a bacterial or viral infection, or often times by a subconjunctival hemorrhage.[3] An acute red eye combined with systemic symptoms (new onset back pain, fever) might indicate a serious medical condition, such as sepsis. Because of this, a medical workup should be initiated.[4] New-onset back pain may also herald a systemic autoimmune disorder such as ankylosing spondylitis, which also requires further medical and laboratory investigation.[5]

If infectious conjunctivitis is suspected, pertinent historical features include recent history of febrile illness, upper respiratory tract symptoms, or recent contact with another individual with a red eye or acute conjunctivitis. Ocular itching may be suggestive of allergic conjunctivitis if associated with tearing and nasal congestion, especially if it occurs in a seasonal pattern. The type of conjunctival discharge experienced by the patient should also be elicited. Green, purulent discharge may be suggestive of bacterial conjunctivitis; watery discharge is more commonly seen with allergic conjunctivitis. Hyperacute, purulent conjunctivitis in an individual with multiple sexual partners may be suggestive of gonococcal conjunctivitis, which may progress rapidly and lead to visual loss.[3] Dermatologic evaluations

Anatomic Structures Seen During a Normal Ophthalmologic Exam



(facial rash) are also important in the history taking and physical examination to determine other infectious or allergic causes of the red eye.

In some individuals, acute onset of bright red subconjunctival hemorrhage can be alarming and may be associated with coughing, sneezing, heavy-lifting, or the Valsalva maneuver. In these situations, a history of anticoagulation therapy (warfarin, aspirin, nonsteroidal anti-inflammatory agent) may also be found. Inquiring about allergies, recent medications, and medical/surgical history, which include recent eye examination, intraocular surgery, ocular trauma, contact-lens wear, or chemical exposure, are also important aspects of historical information that would signal the need for ophthalmologic consultation.[6]

Family history of ophthalmic diseases and general medical conditions are also necessary components of comprehensive history-taking. These conditions include family history of glaucoma, connective tissue diseases (systemic lupus erythematosus, rheumatoid arthritis, Sjögren's syndrome), cancer, and other genetic conditions (Senger's disease, amyloidosis). Exploring the patient's social history may also provide pertinent information such as occupational and environmental hazards that can contribute to the red eye (see *Red Eye Assessment*).

Physical Examination

Prompt referral to an ophthalmologist is warranted if patients complain of decreased vision, photosensitivity, and eye pain in addition to red eye. Physical examination should proceed in a systematic fashion. Obtaining vital signs, especially blood pressure, is an important initial step in the examination since spontaneous cases of red eye may arise from rupture of conjunctival or episcleral blood vessels associated with coughing, sneezing, or hypertension.[1] The physical examination may proceed with a visual acuity assessment and examination of the eyelids, eyelash line, conjunctiva and sclera, cornea, anterior chamber, iris, and lens. If any significant abnormality of these eye structures is observed, the patient should be referred to an ophthalmologist. Anatomical structures that must be reviewed and familiarized for an ophthalmologic exam include the following (see *Anatomic Structures Seen During a Normal Ophthalmologic Exam*):

- **Eyelid.** This protects and moisturizes the eyes. Normal blinking with good eyelid closure is essential for adequate ocular surface (cornea and conjunctiva) wetting.
- **Rows of eye lashes.** These protect the eyes from debris.
- **Conjunctiva**. Conjunctiva is a thin, transparent tissue that covers the outer surface of the eye.
- **Sclera.** This is the white portion of the eye underlying conjunctiva and episclera. Sclera is a tough, opaque tissue that serves as protective outer coat of the eye.
- **Cornea.** This is the avascular, transparent, convex, refractive surface covering the front of the eye. Its tissue architecture maintains clarity for light transmission and it is extremely sensitive because of the presence of multiple nerve endings.
- **Iris.** The iris is the colored part of the eye that controls the level of the light entering the eye.
- **Pupil.** This is the round opening at the center of the iris. The iris sphincter muscle is responsible for pupillary miosis and the iris dilator muscle is responsible for pupillary mydriasis.

Clinical findings during the ophthalmic examination of a patient with an inflammatory or infectious condition may reveal a hypopyon, whereas patients who have suffered blunt trauma may present with a hyphema, or blood in the anterior chamber (see *Hypopyon*). The term hypopyon is given when inflammatory cells (white blood cells) are in the anterior chamber of the eye indicative of inflammation of the anterior eye structures, such as the iris or ciliary body. The presence of discharge and/or lymphadenopathy of the preauricular or submandibular lymph nodes that drain from the periorbital and orbital structures may be indicative of an infectious process and must also be assessed.[6] Evaluation of systemic conditions (autoimmune, rheumatologic disorders) that may have ocular manifestations must also be pursued by direct physical examination (thyroid, joints) and appropriate lab or radiographic testing for signs of inflammation or dysfunction. Scleritis and episcleritis can manifest in patients with rheumatoid arthritis (see *Scleritis*). Patients with scleritis typically complain of more pain than patients with episcleritis; however, these entities may be difficult to distinguish. Tenderness from scleritis can be elicited by allowing the patient to look down and have the examiner gently palpate the closed eyelid overlying affected globe structures.[7]

Red Eye Assessment

Reason for visit:

Allergies: List any allergies to medications and/or foods

Medications: List all meds, herbs, nutritional supplements, over-the-counter eye medicine

Past or recent symptoms:

Do you have, or have you ever had in the past, any of the following conditions? Check each box "yes" or "no." Indicate in comments section if eye disease is unilateral or bilateral. Complete BOTH columns.

	No	Yes	Comments		No	Yes	Comments
Eye pain				History of eye irritation			
Chronic red eye				Foreign body sensation			
Visual loss				Itching/burning			
Recent intraocular surgery				Watering			
Ocular trauma				Facial rash			
				Discharge			

Past medical conditions:

	No	Yes	Comments		No	Yes	Comments
Thyroid disease				Sarcoidosis			
Systemic Lupus Erythematosus				Glaucoma			
Wegener's Granulomatosis				Uveitis			
Rheumatoid Arthritis				Scleritis/episcleritis			

Exposures:

	No	Yes	Comments		No	Yes	Comments
Chemical				Patients with lung infections			
Allergic (poison ivy)				Glaucoma			
Toxic (home eye remedies)				Uveitis			
Patients with eye infections				Scleritis/episcleritis			

Previous eye surgeries (year/surgery/hospital):

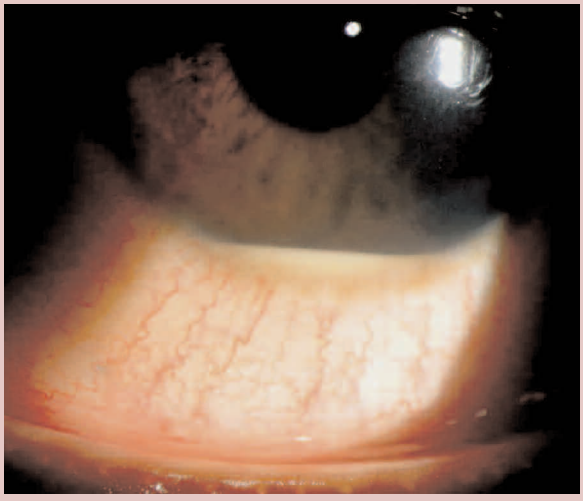
Family history:

Social history:

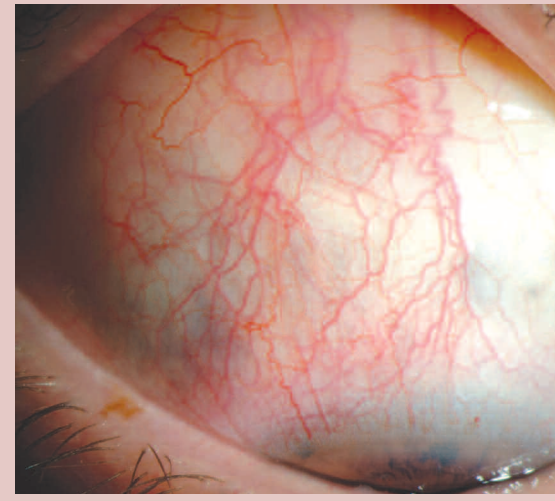
Eye examination:

	Results	Comments (indicate if unilateral or bilateral)
Visual acuity (near card with correction)		
Lids and adnexa: • proptosis • erythema of lids • ecchymosis • rash or vesicles • preauricular lymphadenopathy • lid position		
Pupils: • size • symmetry • reaction to light		
Anterior eye segment: • eyelid margin (thickening, ulcer) • bulbar conjunctiva (injection, edema) • palpebral conjunctiva (follicles, papillae) • conjunctival discharge • cornea (edema, clarity, ulcer, foreign body) • hyphema, hypopyon		

Hypopyon



Scleritis



Acute angle closure glaucoma is an ocular emergency and immediate ophthalmologic referral is necessary. Patients with acute glaucoma complain of severe throbbing with significantly reduced visual acuity. Visual symptoms may also be accompanied by symptoms of nausea and vomiting. Besides a red eye, the cornea may be hazy from diffuse corneal edema, and the pupil may appear mid-dilated or oval in shape. The eye may feel hard with gentle palpation. With the patient's eyelids closed, gentle palpation of the eyelids will reveal a significant pressure difference between the eye with angle closure glaucoma and the eye with normal pressure. However, conditions with bilateral elevations in intraocular pressure have been reported.

Differential Diagnoses

The diagnosis of corneal abrasion can be confirmed by visualizing the cornea with a cobalt-blue filter. To delineate the margins of a corneal abrasion, fluorescein dye can be instilled into the patient's eye. Uptake of the fluorescein dye by the corneal stroma, which appears green with the cobalt-blue filter, can also provide information about the disrupted corneal epithelial integrity overlying the abrasion.[8] Infectious corneal ulcers may be difficult to distinguish from mild corneal abrasions. However, a white infiltrate or opacity underlying the area of disrupted corneal epithelium may be indicative of an infectious corneal ulcer. These conditions, as well as nonhealing corneal abrasions, require urgent referral to an ophthalmologist. Additional differential diagnoses to consider include:

- **Subconjunctival hemorrhage.** This consists of bleeding of conjunctival or episcleral blood vessels to the subconjunctival space caused by trauma, a spontaneous event, or systemic illness. It is a self-limiting condition that does not require treatment.[9]
- **Blepharitis.** Inflammation of eyelid margin that may be caused by staphylococcal infection or seborrheic changes on the eyelid margins.[9] Chronic blepharitis requires ophthalmic referral, as sebaceous cell carcinoma may rarely present as chronic blepharitis.
- **Dry eye.** An ocular surface inflammatory condition with decreased tear production, increased tear evaporation, or abnormality in the tear film layer.[10] Dry eye may be associated with rheumatic conditions such as Sjögren's syndrome.[11]
- **Allergic conjunctivitis.** This results from direct exposure of eye mucosa to environmental allergens (pollen, dust, animal dander) leading to chemosis.[1]
- **Infectious conjunctivitis.** This can have a viral, bacterial, or chlamydial etiology. Viral conjunctivitis tends to have lymphoid follicles in the undersurface of the lids and tender preauricular lymphadenopathy, while bacterial conjunctivitis features purulent discharge.[9] Acute bacterial conjunctivitis is often self-limiting.[12] Chlamydial conjunctivitis is common among sexually active individuals with multiple partners and may be associated with urethritis or salpingitis.
- **Corneal abrasion.** Disruption of the corneal epithelium that may result from trauma (fingernail, paper cut). Next day follow-up is necessary for an uncomplicated corneal abrasion to prevent further ocular complications.[13]
- **Anterior uveitis.** Inflammation of the anterior segment of the eye that can be caused by infectious, autoimmune, toxic, malignant, or traumatic processes.[14]
- **Microbial keratitis.** Active corneal infectious process that requires antibiotic therapy and vigilant follow-up. Risk factors include contact lens wear, trauma, corneal surgery,

ocular surface disease, systemic comorbidities, and an immunocompromised state. May be caused by bacteria, fungus, or acanthamoeba species.[15]

- **Episcleritis and scleritis.** Inflammation of superficial (episcleral) tissues or deeper (sclera) planes of the ocular surface, which may be associated with episcleral or scleral vessel engorgement. Scleritis may be diffused or limited to an isolated structure with tenderness to area of injection.[7] Scleritis is most commonly associated with rheumatoid arthritis and comprehensive work-up for autoimmune conditions is necessary.
- **Chemical injury.** Alkali burns are more damaging than acid burns because of rapid penetration into the cornea and anterior chamber.[16] Emergent referral to an ophthalmologist is necessary for alkali burns.
- **Angle closure glaucoma.** Usually severely painful and caused by preexisting anatomic narrowing of the anterior chamber angle. They are common among farsighted and elderly patients because of lens enlargement and anterior displacement of the lens-iris diaphragm. Requires immediate ophthalmological consultation.[9]

Common Therapies

Nonpharmacologic management

A cold compress may be used as symptomatic relief, especially for ocular pruritus seen in ocular allergy.[10] Warm compresses may be useful for blepharitis. Lid scrub or eyelid hygiene using nonstinging baby shampoos are necessary to manage red eyes caused by blepharitis.[9]

Eye patching is used to immobilize lid margins to minimize pain and irritation caused by large corneal abrasions, while eye shields are used to prevent pressure or contact with the eye when a globe rupture is suspected. The eye patch can be removed once normal eye sensation has returned. Double eye patching plus use of dim lighting with systemic analgesics are recommended for the management of corneal flash burns from extensive exposure to ultraviolet light.[1] Caution is advisable in patients with suspected infectious keratitis or conjunctivitis. Do not patch the eye when treating infectious conjunctivitis.

Foreign bodies that are easily seen with direct observation can be removed with a moistened cotton-tipped applicator after applying a local anesthetic. However, foreign bodies that are deep and hard to remove, as well as those with extensive rust, should be referred to an ophthalmologist for removal.

Discontinuance of offending medications must be initiated for red eye caused by pharmaceutical agents. For allergic conjunctivitis, avoidance of the allergen is the optimal treatment. Topical and systemic antihistamines may also be useful for the treatment of seasonal allergy. Use of sunglasses for people with dry eyes must be considered to preserve the tear film.[7] Scrupulous hand washing is critical to prevent transmission of the etiologic agent causing viral conjunctivitis.

It is important to determine the cause of the red eye early so that proper management can be instituted for patients that require emergency care (corneal ulcer, narrow angle glaucoma, penetrating foreign bodies, iritis), immediate ophthalmological referral (any acute visual changes, photosensitivity, eye pain), or management in the primary care setting (uncomplicated cases of blepharitis, subconjunctival hemorrhage conjunctivitis, presence of extraocular foreign bodies). Patients with suspected viral conjunctivitis should be referred to an ophthalmologist to monitor the development of keratitis, which can develop one week after its onset.[1]

Pharmacologic management

Irrigation with copious amount of saline, brisk pain management, and immediate comanagement with an ophthalmologist is necessary for red eye caused by chemical exposure.[16] Generous use of artificial tears is recommended for patients with dry eyes and may also dilute the number of allergens in contact with the eye mucosa for allergic conjunctivitis cases.[10] Anti-inflammatory agents such as topical corticosteroids or cyclosporine may be of benefit in some patients with moderate-to-severe dry eye and should be managed with an ophthalmologist.[11]

Topical antibiotics have been shown to have limited efficacy in improving clinical outcomes for acute bacterial conjunctivitis, but may be associated with more rapid resolution of clinical infection.[12] Most practitioners prescribe empiric, broad-spectrum topical antibiotics (gentamicin, tobramycin) without culture for mild-to-moderate cases of bacterial conjunctivitis. Topical fluoroquinolones (ciprofloxacin, ofloxacin) are equally effective but are mostly reserved for more severe cases.[3] Use of an antibiotic eye drop is also recommended for persistent allergic or viral conjunctivitis to prevent secondary bacterial infection. Topical antibiotics are recommended for corneal abrasions. Antibiotic ointment is indicated after foreign body removal. These patients must be seen 2 days after foreign body removal to assess for infection.[1]

Topical second generation antihistamines in combination with topical vasoconstrictors are recommended to manage allergic conjunctivitis. Mast cell stabilizers (cromolyn) and oral antihistamines are utilized for severe forms of allergic conjunctivitis.[10] Topical corticosteroid ointments and steroid eye drops may be utilized for allergic conjunctivitis but should be prescribed by an ophthalmologist to monitor for side effects, including cataract formation and development of glaucoma.

Use of nonsteroidal anti-inflammatory drugs (ketorolac) have also been recommended to manage allergic conjunctivitis because this class of medications does not mask an ocular infection, interfere with wound healing, increase intraocular pressure, or contribute to cataract formation.[10] They may also be considered as initial therapy for scleritis and episcleritis, but referral to an ophthalmologist is required for definitive treatment. Topical anesthetics (proparacaine) are not advisable because corneal toxicity, corneal perforation, and microbial keratitis may occur with long-term use.[17]

Miotic drops (pilocarpine 1% to 2%) may be necessary as an initial management for acute glaucoma, but suspicion for acute angle closure glaucoma should prompt immediate referral to an ophthalmologist for definitive treatment.[1]

Ensuring Optimal Management

Patients with red eye frequently require evaluation in the primary care setting. The key to proper management is to determine the correct diagnosis early and to prevent further ocular morbidity and complications. Understanding the causes, symptoms, clinical examination features, and therapy of the various etiologies of a red eye is important for any primary care practitioner to ensure optimal management for this common complaint.

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AUTHORS' DISCLOSURE

The authors have disclosed that they have no significant relationship or financial interest in any commercial companies that pertain to this educational activity.

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