

**THE RED EYE**  
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Week 25

**Educational Objectives:**

1. Know the differential diagnosis and presentation of specific etiologies of the red eye
2. Be able to evaluate patients presenting with red eye
3. Learn the differential diagnosis and treatment of conjunctivitis
4. Understand when to refer a patient presenting with red eye to the ophthalmologist and the degree of urgency of the referral

**CASE ONE:**

**Ms. C is a 28-year-old woman who presents with a painful red right eye.**

**Questions:**

**1. What is the differential diagnosis of the red eye?**

*The differential diagnosis of the red eye can be divided into the categories of 'Painful red eye', 'Traumatic conditions', and 'Other'. Please refer to Table 1 in the Wirbelauer article and Table 1 in the Liebowitz article.*

*You may want to review the anatomy of the eye and some terms.*

*Conjunctivitis is an inflammation of the conjunctiva, the most superficial layer of the eye. Episcleritis is a localized inflammation beneath the conjunctiva and adjacent to the sclera. Keratitis is inflammation of the cornea, the anterior portion of the sclera. Iritis, endophthalmitis, iridocyclitis, and anterior uveitis usually are the same entity, and refer to inflammation in the anterior chamber, including the iris and possibly ciliary body. Blepharitis is inflammation of the eyelid.*

## 2. What history would you obtain from the patient?

*Along with the typical history about the red eye, including duration and nature of symptoms, previous eye and medical problems, and exposure history, it is important to ascertain the following in all patients with the red eye.*

- *Was there trauma?*
- *Is vision affected?*
- *Is there a foreign body sensation? Presence of foreign body sensation is indicative of an active corneal process which may or may not include an acutal foreign body. In this situation, the patient is unable to spontaneously open the eye and keep it open. This should be distinguished from a “gritty or scratchy feeling” or “like sand in the eyes” which is not indicative of a corneal process, but rather seen with conjunctivitis or keratoconjunctivitis sicca (dry eyes). In these cases, the patient is able to maintain an open eye without much difficulty.*
- *Is there photophobia? Presence of photophobia suggests an active corneal process or iritis. Iritis may be distinguished from a corneal process as it does not present with foreign body sensation.*
- *Is there discharge? In most cases discharge is seen in red eyes caused by self-limited processes such as conjunctivitis, dry eyes, or sty.*
- *Is the patient a contact lens wearer? Contact lens use should raise suspicions of keratitis.*

### **CASE ONE CONTINUED:**

**The patient tells you that there is no history of trauma. She wears contact lenses. Her eye has been painful and red since yesterday. She feels like there is something in her eye and the light bothers her. She feels as if her vision is impaired on that side.**

## 3. How would you evaluate this patient?

*The following elements of the physical examination should be assessed in all patients with red eye. It is important to note that useful information may be obtained without the use of a slit lamp and without performing a dilated fundus examination, as most internists do not have the tools to perform those elements of the examination in the office.*

- Measurement of visual acuity  
*This may be done using a Snellen chart, however more important than determining exactly whether vision is 20/50 or 20/20, is to determine a crude assessment of vision. Assessment of light perception, form vision (counting fingers), and reading vision (small vs. large print) is quickly and easily performed, and provides useful information.*

- Penlight examination  
Assessment of pupil size  
Pinpoint pupils may be seen in cases of corneal abrasion, keratitis, and iritis.  
  
Assessment of pupil reactivity  
The pupil is fixed at typically 4-6 mm in cases of angle closure glaucoma.
- Is there purulent discharge?  
Although discharge may be present with many eye disorders, purulent discharge is often thick and white or yellow in color, as opposed to nonpurulent discharge, which is often clear, colorless.
- What is the pattern of redness?  
Focal injection may be suggestive of episcleritis, scleritis, and subconjunctival hematoma. Ciliary flush, injection that appears as a red ring about the iris where the cornea undergoes transition to the sclera, may be seen in keratitis, iritis, or angle closure glaucoma.
- Is there a hypopyon or a hyphema?  
Hypopyon is a layer of white cells in the anterior chamber, as may be seen in cases of keratitis. (See hypopyon in figure 9 of the Leibowitz article). Hyphema is a layer of red cells in the anterior chamber. These are signs of trauma to the globe. Both hypopyon and hyphema require immediate referral to an ophthalmologist.

#### **CASE ONE CONTINUED:**

**Ms. C's right eye is diffusely red. There is some white discharge. Although your penlight bothers her, with it you can see that the cornea is hazy and has a round white spot in the lower lateral quadrant. General vision is impaired in that eye. Fluorescein staining demonstrates an ulcer.**

4. **What is a likely diagnosis in this patient? How would you treat Ms. C?**  
As Ms. C is a contact lens wearer, she is at increased risk of keratitis. The history and physical examination, particularly the corneal ulcer or hypopyon, is strongly suggestive of keratitis. Keratitis may be secondary to infection (viruses, bacteria) and/or inflammation (due to dry eyes, contact lenses, blepharitis, eyelid abnormalities, exposure to ultraviolet light). The patient with suspected keratitis should be referred to an ophthalmologist within 24 hours. The diagnosis and management of this disorder requires a slit lamp.

5. **If the fluorescein stain showed a branching or dendritic looking ulcer, what would be the most likely diagnosis?**

*Herpes simplex keratitis may have this appearance. This entity is usually self limited but the patient may experience fewer symptoms and a shorter course with topical and oral antiviral medications.*

**CASE TWO:**

**Mr. B is a 31-year-old kindergarten teacher who comes to see you for an itchy, red eye he noticed yesterday. There is no history of trauma, and no photophobia. It is not painful, and there is no change in vision. He noted crusting of his right eyelid this morning and it was hard to open. Physical examination reveals dilatation of the superficial conjunctival blood vessels, involving conjunctiva inside the lid (palpebral conjunctiva) and on the globe (bulbar conjunctiva). You note hyperemia and edema of the conjunctiva, and watery discharge. You diagnose the patient with unilateral conjunctivitis.**

6. **What is the differential diagnosis of conjunctivitis?**

*Conjunctivitis is a common cause of red eye seen by the internist. Differential diagnoses and a description of the etiologies follow below.*

- *Viral conjunctivitis*  
*Conjunctivitis caused by viral infection is the most common form of conjunctivitis. The most common infecting agent is adenovirus. Viral conjunctivitis may develop during or after a URI. Patients present with itchy red eye. It usually begins unilaterally, but often the other eye becomes infected. There is no impairment of vision, pain, or photophobia. Examination reveals conjunctival hyperemia, edema, and often lid swelling. There is a watery discharge. Palpable preauricular lymph nodes may be present. This form of conjunctivitis is usually self-limited. The use of antibacterial eyedrops is controversial. Although bacterial superinfection of viral conjunctivitis is uncommon, antibacterial eye drops have been recommended in the literature to prevent bacterial superinfection. Topical antiviral drugs are not recommended.*
- *Bacterial conjunctivitis*  
*Bacterial conjunctivitis may be caused by gram positive and/or gram negative organisms. The eye will be red but will have a purulent discharge at the base of the eye lashes and subsequent matting of the lids.*

*Treatment is with topical antibiotic drops four times daily. Choices include gentamicin, tobramycin, or fluoroquinolones. Bacitracin and erythromycin are available in ointment form. Referral to an ophthalmologist should occur if symptoms are not resolved within a week.*

- *Hyperacute bacterial conjunctivitis*  
*This form of conjunctivitis is caused by gonorrhea. It is characterized by an abrupt onset, rapid progression, and copious purulent discharge that reaccumulates as it is wiped away. The conjunctiva is extremely red and inflamed. The eyelid may be swollen. Periauricular adenopathy is often present. (Figure 4 of Leibowitz article).*

*If untreated, hyperacute bacterial conjunctivitis can progress to corneal ulceration and possibly perforation. Immediate referral to an ophthalmologist is warranted. Treatment is with topical and systemic antibiotics.*

- *Chlamydial conjunctivitis*  
*Chlamydial infection of the eye causes trachoma and inclusion conjunctivitis. Trachoma is rarely seen in the U.S. Genital tract infection may be symptomatic or not, and hand to eye contact with infected genital secretions can cause inclusion conjunctivitis (Figure 5, Leibowitz article). The red eye usually expresses a purulent discharge. A distinguishing feature of chlamydial conjunctivitis is that there may be prominent follicles in the inferior fornix of the conjunctiva. Additionally, a preauricular node may be present.*

*Treatment is with topical and systemic antibiotics. Referral to an ophthalmologist is warranted if the patient does not improve within several days of initiation of therapy.*

- *Allergic conjunctivitis*  
*Allergic conjunctivitis is a seasonal IgE mediated hypersensitivity reaction to environmental allergens. It presents like viral conjunctivitis but is usually bilateral. Over the counter ocular anti-histamines with a vasoconstrictor may relieve symptoms.*

**7. What is the most likely diagnosis in this patient? How would you treat him?**

*This patient most likely has viral conjunctivitis and should be treated with antibacterial eye drops or ointment. Viral conjunctivitis is extremely contagious. Replicating virus has been demonstrated in 95% of patients 10 days after appearance of symptoms. (Leibowitz, 2000) Good hygiene must be maintained to avoid spread of the virus. It has been recommended that those who work with the public in schools or health care facilities should be*

*given a two-week leave of absence to avoid spread of infection. (Galor, 2008)  
This recommendation may be difficult to comply with.*

*An infrequent complication of viral conjunctivitis is superficial keratitis. If symptoms persist for longer than two weeks or progress during that time period, the patient should be referred to an ophthalmologist.*

### **CASE THREE:**

**Mr. B is a 72-year-old man who schedules an urgent visit with you for a headache. The headache is right-sided and behind his right eye. It began gradually over the previous evening and he describes it as “the worst headache of my life”. It is accompanied by nausea, vomiting, and decreased visual acuity. When he is able to open his eye, he feels like he sees “halos” around the lights. On physical examination the patient has a red right eye, with ciliary flush (injection that appears as a red ring about the iris where the cornea undergoes transition to the sclera). The cornea is hazy and the pupil is fixed, semi-dilated, and oval. Vision is severely impaired. On gentle palpation the right eye feels firmer than the left eye.**

#### **8. What is the diagnosis?**

*The diagnosis is angle closure glaucoma. Although we often think of patients with the worst headache of their life as having sub arachnoid hemorrhage until proven otherwise, it is important to recognize that angle closure glaucoma can also present with this severe of a headache rather than eye pain.*

*In the normal eye, aqueous humor is produced by the ciliary body, flows through the pupil, reaches the anterior chamber and then into Schlemm’s canal, from which it drains into the venous system. In angle closure glaucoma, this outflow of aqueous humor is prohibited. As a result, there is a rapid, substantial rise in intraocular pressure which causes a painful, red eye.*

*People with hyperopia (farsightedness) and older people are at risk because the globe has a shortened axial length, and a greater anterior-posterior dimension which may push the iris forward. Symptoms may begin in the evening or in circumstances when a person is in a place where it is dark, when mydriasis will occur.*

**9. How would you manage this patient?**

*Mr. B needs to be referred to an ophthalmologist immediately as angle closure glaucoma is an ocular emergency. If not treated urgently, optic nerve damage and irreversible loss of vision could occur. Diagnosis is confirmed with measurement of intraocular pressure. Topical and systemic agents to lower intraocular pressure are administered.*

**CASE FOUR:**

**Mark M. is an 8-year-old boy who was hit in the eye with his brother's finger. He noted immediate intense pain, foreign body sensation, and photophobia. Physical examination is difficult because the child won't open his eye.**

**10. How will you evaluate this patient?**

*Local anesthetic drops are often useful to help the patient open the affected eye.*

**CASE FOUR CONTINUED:**

**The patient's eye is mildly red in the lower medial quadrant. Vision is unaffected, the pupil reacts normally. Fluorescein staining reveals a corneal abrasion. (Figure 5 in the Galor/Jeng article, Reference 1)**

**11. How will you manage this patient?**

*The patient has a corneal abrasion and should be given antibiotic eye drops or ointment to prevent infection until the cornea is healed. Eye patching is not recommended, as controlled studies have not found patching to improve the symptoms or rate of healing. Most abrasions heal within several days because of rapid proliferation of epithelial cells.*

**12. Does this patient need to be referred to an ophthalmologist?**

*If vision had been affected initially or if symptoms persist more than 48 hours the patient should be referred to an ophthalmologist.*

### **Primary References:**

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