

**Eye Care Skills: Presentations for Physicians
and Other Health Care Professionals Version 3.0**

Managing the Red Eye

Speaker Notes

Karla J. Johns, MD
Executive Editor

 **AMERICAN ACADEMY
OF OPHTHALMOLOGY**
The Eye M.D. Association

Developed by

Sue Ellen Young, MD,
in conjunction with the Ophthalmology Liaisons
Committee of the American Academy of
Ophthalmology

Reviewer, 2009 Revision

Miriam T. Light, MD

Executive Editor, 2009 Revision

Karla J. Johns, MD

Ophthalmology Liaisons Committee

Carla J. Siegfried, MD, *Chair*

Donna M. Applegate, COT

James W. Gigantelli, MD, FACS

Kate Goldblum, RN

Karla J. Johns, MD

Miriam T. Light, MD

Mary A. O'Hara, MD

Judy Petrunak, CO, COT

David Sarraf, MD

Samuel P. Solish, MD

Kerry D. Solomon, MD

The Academy gratefully acknowledges the contributions of numerous past reviewers and advisory committee members who have played a role in the development of previous editions of the Eye Care Skills slide-script.

Academy Staff

Richard A. Zorab

Vice President, Ophthalmic Knowledge

Barbara Solomon

Director of CME, Programs & Acquisitions

Susan R. Keller

Program Manager, Ophthalmology Liaisons

Laura A. Ryan

Editor

Debra Marchi

Permissions

The authors state that they have no significant financial or other relationship with the manufacturer of any commercial product or provider of any commercial service discussed in the material they contributed to this publication or with the manufacturer or provider of any competing product or service.

The American Academy of Ophthalmology provides this material for educational purposes only. It is not intended to represent the only or best method or procedure in every case, or to replace a physician's own judgment or to provide specific advice for case management. Including all indications, contraindications, side effects, and alternative agents for each drug or treatment is beyond the scope of this material. All information and recommendations should be verified, prior to use, using current information included in the manufacturer's package inserts or other independent sources, and considered in light of the patient's condition and history. Reference to certain drugs, instruments, and other products in this publication is made for illustrative purposes only and is not intended to constitute an endorsement of such. Some materials may include information on applications that are not considered community standard that reflect indications not included in approved FDA labeling, or that are approved for use only in restricted research settings. The FDA has stated that it is the responsibility of the physician to determine the FDA status of each drug or device he or she wishes to use, and to use them with appropriate patient consent in compliance with applicable law. The Academy specifically disclaims any and all liability for injury or other damages of any kind, from negligence or otherwise, for any and all claims that may arise from the use of any recommendations or other information contained herein.

Slides 12 and 24 are reprinted, with permission, from Carr T, *Ophthalmic Medical Assisting*, 3rd Edition, San Francisco: American Academy of Ophthalmology; 2002.

Slide 48 is published courtesy of W. K. Kellogg Eye Center, University of Michigan.

Slides 66 and 73 are reprinted, with permission, from Sutphin JE, *Basic and Clinical Science Course: Section 8: External Disease and Cornea*, San Francisco: American Academy of Ophthalmology; 2005.

Slide 68 is reprinted, with permission, from Trobe JD, *The Physician's Guide to Eye Care*, 2nd Edition, San Francisco: American Academy of Ophthalmology; 2001.

Slides 69 and 70 are reprinted, with permission, from Simon JW, *Basic and Clinical Science Course: Section 6: Pediatric Ophthalmology and Strabismus*, San Francisco: American Academy of Ophthalmology; 2005.

Slide 78 is reprinted, with permission, from Moorthy RS, *Basic and Clinical Science Course: Section 8: Uveitis*, San Francisco: American Academy of Ophthalmology; 2005.

Slides 80 and 81 are reprinted, with permission, from Simmons ST, *Basic and Clinical Science Course: Section 10: Glaucoma*, San Francisco: American Academy of Ophthalmology; 2005.

CONTENTS

A GUIDE TO PRESENTING <i>MANAGING THE RED EYE</i>	3
INTRODUCTION	4
EVALUATION	5
DISORDERS OF THE OCULAR ADNEXA	8
Hordeolum and Chalazion	8
Blepharitis.....	10
Cellulitis 11	
LACRIMAL SYSTEM DISORDERS	13
Nasolacrimal Duct Obstruction	14
OCULAR SURFACE DISORDERS	15
Conjunctival/Scleral Anatomy.....	15
Conjunctivitis.....	16
Bacterial Conjunctivitis	17
Viral Conjunctivitis.....	18
Allergic Conjunctivitis.....	19
Neonatal Conjunctivitis	19
Subconjunctival Hemorrhage	21
Dry Eyes	21
Exposure Keratitis.....	23
Pinguecula/Pterygium.....	23
ANTERIOR SEGMENT DISORDERS	24
Corneal Anatomy, Symptoms, and Examination.....	25
Corneal Abrasion	27
Chemical Burns.....	29
Contact Lens Overwear	30
Infectious Keratitis.....	30
Bacterial Keratitis	31
Viral Keratitis	31
Hyphema.....	33
Inflammatory Conditions.....	33
Acute Angle-Closure Glaucoma.....	35
SUMMARY	37
APPENDIX 1: COMMON RED EYE DISORDERS: DIAGNOSIS AND MANAGEMENT...	39
APPENDIX 2: THE RED EYE: DIFFERENTIAL DIAGNOSIS	44
APPENDIX 3: RESOURCES	45

A GUIDE TO PRESENTING

Managing the Red Eye

Managing the Red Eye introduces the primary care physician to skills useful in evaluating the red eye and provides a practical clinical approach to diagnosis and treatment of many common red eye disorders. Additionally, the audience will learn how to recognize more serious, vision-threatening red eye disorders for prompt referral to an ophthalmologist.

The program takes an anatomic approach to common red eye disorders and their management. Normal anatomy is reviewed as it relates to the pathophysiology of common diseases that contribute to the red eye. Included are disorders of the ocular adnexa (lids, orbit), lacrimal system, ocular surface (conjunctiva and sclera), and anterior segment (cornea and anterior chamber). Key concepts, such as side effects of topical steroids, and management for such emergent red-eye conditions as cellulitis, chemical burns, and acute angle-closure glaucoma are presented.

Approximate Running Time

50 to 90 minutes

Suggested Audience

- Family physicians
- Emergency physicians
- Internists
- Pediatricians
- Medical students, interns, residents
- Emergency-room personnel (non-MD)
- State and local meetings of national medical societies, AAFP, AAP, ACP, ACEP

INTRODUCTION

SLIDE

1

Physicians frequently encounter patients who complain of a red eye. This slide program provides an approach to differential diagnosis of conditions that can cause a red eye, helping physicians understand which conditions causing a red eye require immediate treatment, which may wait a few days, and which do not require treatment.

SLIDE

2

All subjective ocular complaints fall into three categories of symptoms: decreased vision, pain, and redness. Different types of decreased vision can be blurred vision from a foreign body disrupting the corneal surface or a dark haze that might come from a hyphema. With a careful history, different kinds of pain can be elicited, such as photophobia from corneal edema resulting from angle closure glaucoma or uveitis, foreign body sensation from an abrasion, or deep boring pain from scleritis or severe uveitis. Careful examination will show if the redness is unilateral, localized, or involves the lids. Eyelid disorders frequently bring patients with a red eye to the doctor, and so the lids should be considered as part of a systematic evaluation of ocular complaints.

SLIDE

3

Redness of the eyes and lids is caused by three types of problems: Mechanical trauma such as a foreign body or abrasion, chemical trauma such as an acid or alkali burn, and infection/inflammation, such as a corneal ulcer or uveitis.

Introduction

DIFFERENTIATE RED EYE DISORDERS

- Needs immediate treatment
- Needs treatment within a few days
- Does not require treatment



Introduction

SUBJECTIVE EYE COMPLAINTS

- Decreased vision
- Pain
- Redness

Characterize the complaint through history and exam.

Introduction

TYPES OF RED EYE DISORDERS

- Mechanical trauma
- Chemical trauma
- Inflammation/infection

In order of urgency, the conditions that cause most red eye complaints are (1) chemical injury, (2) angle-closure glaucoma, (3) ocular foreign body, (4) corneal abrasion, (5) uveitis, (6) conjunctivitis, (7) ocular surface disease, and (8) subconjunctival hemorrhage. There may be different subsets in each category; for instance, conjunctivitis may be bacterial, viral, or allergic. Ocular surface disease may be an ectropion causing exposure, dry eyes, or an inflamed pinguecula. Some entities may cross categories: an infection early on may be bacterial conjunctivitis with minimal discomfort, but if it becomes a corneal ulcer it will initially feel like a foreign body. If it advances to endophthalmitis, it will cause severe uveitis-like pain.

ETIOLOGIES OF RED EYE

- Chemical injury
- Angle-closure glaucoma
- Ocular foreign body
- Corneal abrasion
- Uveitis
- Conjunctivitis
- Ocular surface disease
- Subconjunctival hemorrhage

EVALUATION

A systematic diagnostic approach to the patient with a red eye will help the physician reach a differential diagnosis that will include most of the causes of a red eye. As with any diagnostic problem, the information obtained from a careful history and examination should direct the approach to management. The “redness” in a red eye usually comes from dilated conjunctival blood vessels (the sclera is less vascular), as in the case of “pink eye,” or, rarely, torn blood vessels, which may exude bright red blood in a subconjunctival hemorrhage. The onset of a red eye, duration, and clinical course should be recorded to help distinguish the causative agent: trauma, chemicals, infection, allergy, or systemic conditions.

RED EYE: POSSIBLE CAUSES

- Trauma
- Chemicals
- Infection
- Allergy
- Systemic conditions

SLIDE

6

Specific symptoms may reveal the cause of the red eye. For example, itching typically signifies allergies. A burning sensation suggests lid, conjunctival, or tear film disorders, or corneal abrasions or foreign bodies. A foreign-body sensation might signify an embedded foreign body, a corneal abrasion, or an inturned eyelash. Localized lid pain or tenderness in the lids is a common presenting complaint of a hordeolum or an acute chalazion.

SLIDE

7

Deep, intense, aching pain that is not localized may reflect a large corneal abrasion, scleritis, iritis or acute glaucoma. Photophobia, pain when exposed to bright light, is caused by ciliary body muscle spasm, and indicates problems arising from the anterior segment of the eye, such as corneal abrasions, iritis, and acute glaucoma. A halo seen around a light is caused by corneal edema, seen in acute glaucoma and uveitis. Halo vision without pain can also be seen in contact lens overwear and cataracts.

SLIDE

8

To evaluate the red eye, the primary care physician needs a visual acuity chart, a penlight with a blue filter, fluorescein dye, and topical anesthetic drops.

RED EYE: CAUSE AND EFFECT

Symptom	Cause
Itching	Allergy
Burning	Lid disorders, dry eye
Foreign body sensation	Foreign body, corneal abrasion
Localized lid tenderness	Hordeolum, chalazion

RED EYE: CAUSE AND EFFECT (Continued)

Symptom	Cause
Deep, intense pain	Corneal abrasions, scleritis, iritis, acute glaucoma, sinusitis, etc.
Photophobia	Corneal abrasions, iritis, acute glaucoma
Halo vision	Corneal edema (acute glaucoma, uveitis)



Equipment needed to evaluate red eye

SLIDE

9

The examination should begin with a visual acuity recording. A Snellen chart at 20 feet should be available in most offices, but a near vision card can be used. For young children, an eye chart using pictures can be used. Patients who wear eyeglasses or contact lenses should wear them for testing if possible. Remember that a patient over 40 years of age with good distance vision probably still needs reading glasses for near vision.

A red eye with decreased vision could signal a vision-threatening disorder. In general, red eyes with no vision loss can usually be treated by family physicians, but red eyes with any vision compromise should be referred where possible to an ophthalmologist.

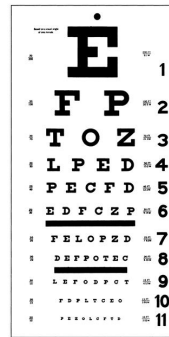
SLIDE

10

After visual acuity is checked, systematic examination of the eye and adnexa should then be conducted, starting anteriorly with the face and lids and moving posteriorly to globe. The face, orbital area, and lids are inspected first, then the ocular movements, and finally the globe itself. A slit-lamp biomicroscope is essential for examination of the anterior chamber, although careful scrutiny of the cornea with a penlight can yield a wealth of information.

Similarly, a tonometer (Schiotz, applanation, or TonoPen) to check intraocular pressure is the easiest way to rule out angle closure glaucoma, but a careful history and penlight exam can elicit the possibility of that condition.

Evaluation



Refer red eye with vision loss to ophthalmologist for evaluation

Evaluation

RED EYE DISORDERS: AN ANATOMIC APPROACH

- Face
- Adnexa
 - Orbital area
 - Lids
 - Ocular movements
- Globe
 - Conjunctiva, sclera
 - Anterior chamber (using slit lamp if possible)
 - Intraocular pressure

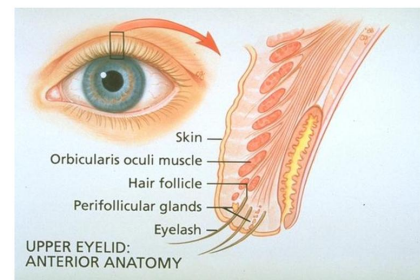
DISORDERS OF THE OCULAR ADNEXA

SLIDE

11

A number of conditions cause redness of the ocular adnexa, although they may not actually cause the eye itself to become red. These conditions are discussed here because many lid problems are intricately connected to ocular surface disease and infections. Most of these conditions can be easily diagnosed and managed in the office. A cross-sectional view of the normal eyelid demonstrates anatomy pertinent to these disease entities. Anteriorly, note the skin, muscle, eyelashes, and perifollicular glands.

Disorders of the Ocular Adnexa



Hordeolum and Chalazion

SLIDE

12

Surrounding the follicles at the base of the eyelashes are oil glands, which, when obstructed, produce a hordeolum, or sty. A hordeolum may look like a pimple and develops near the skin surface on the anterior margin of the lid, adjacent to the cilia. Hordeola with swelling only are *usually not* infected, although redness and discomfort may be signs of infection.

Disorders of the Ocular Adnexa

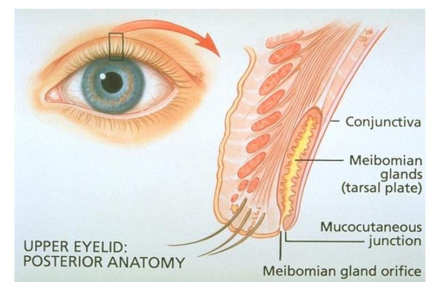


SLIDE

13

The meibomian gland is a sebaceous gland that secretes the oily component of tears. There are approximately 30 to 40 vertically oriented meibomian glands across a normal lid. The meibomian glands are in the posterior aspect of the lid, behind the orbital septum and just in front of the cartilage tarsal plate, which provides support for the lids.

Disorders of the Ocular Adnexa



SLIDE

14

The meibomian glands drain through small opening on the posterior edge of the lid margin. When obstructed, these glands may produce a tender, red swelling in the adjacent lid tissue called a chalazion.



Chalazion

SLIDE

15

Treatment of a hordeolum or chalazion is aimed at promoting drainage of these inflamed glands. Hot compresses (warmer than lukewarm but not so hot that they burn) applied to the affected lid area externally for 10 minutes, 3 times daily, are highly effective for acute or subacute lesions. Compresses may have to be continued for several weeks until the condition is resolved. Because both conditions are usually sterile, topical antibiotics are usually unnecessary. Should a chalazion become a chronic, nontender, localized mass, drainage is achieved by incision and curettage by an ophthalmologist. Systemic antibiotics are usually not indicated for these localized lid disorders unless diffuse cellulitis also is present.

Disorders of the Ocular Adnexa

Disorders of the Ocular Adnexa

HORDEOLUM/CHALAZION: TREATMENT

- **Goal**
 - To promote drainage
- **Treatment**
 - Acute/subacute: Warm-hot compresses, tid
 - Chronic: Refer to ophthalmologist

Blepharitis

SLIDE

16

Blepharitis is a chronic eyelid inflammation affecting the eyelashes and the glands surrounding the eyelashes, and sometimes associated with dry eyes. Seborrhea is noted as collarettes of dried skin and wax around the base of the lashes of the upper and lower lids. Associated localized redness may be caused by Staphylococcal infection. Typically, a patient complains of burning, matting of the lashes, and eyelids sticking together upon awakening, but patients also may be asymptomatic.

SLIDE

17

This slide shows collarettes of dried skin and wax at the base of the eyelashes in a patient with blepharitis. Frequently seborrhea of the scalp, eyebrows, ears, and face is noticeable, and rosacea of the face may be present.

Disorders of the Ocular Adnexa

BLEPHARITIS

- Inflammation of lid margin
- Associated with dry eyes
- Seborrhea causes dried skin and wax on base of lashes
- May have Staphylococcal infection
- Symptoms: lid burning, lash matting

Disorders of the Ocular Adnexa



Collarettes on eyelashes of patient with blepharitis

Treatment of blepharitis is directed toward proper face and lid hygiene. Instruct the patient to use hot compresses to loosen the crusting and to cleanse the lashes twice daily with a washcloth, cotton-tipped swabs moistened with nonirritating shampoo (such as a baby shampoo) diluted with water, or commercially available over-the-counter eye scrub pads. Other treatment options include applying antibiotic ointment, such as erythromycin, to the lids, or applying an antibiotic-steroid ointment, such as Tobradex or Blephamide. The combination antibiotic-steroid ointments can reduce inflammation in conjunction with other treatments. Oral doxycycline (Vibramycin 100 mg daily for 1 month) is helpful in treating refractory cases by changing the nature of the secretions produced by the meibomian glands.

BLEPHARITIS: TREATMENT

- Lid and face hygiene
 - Warm compresses to loosen deposits on lid margin
 - Gentle scrubbing with nonirritating shampoo or scrub pads
- Artificial tears to alleviate dry eye
- Antibiotic or antibiotic-corticosteroid ointment
- Oral doxycycline 100 mg daily for refractory cases

Cellulitis

Cellulitis anterior to the orbital septum presents as edema and erythema of the lids. The lids are often tender to the touch. The edema may be so severe that the lids are swollen shut. In cases of anterior (periorbital or preseptal) cellulitis, the visual acuity, pupils, and mobility are normal, and there is no proptosis. These cases should be treated with systemic antibiotics and warm compresses. A CT scan should be considered if there are concerns that the orbit is involved or if the condition fails to respond promptly to antibiotic therapy.



Preseptal cellulitis

SLIDE

20

If the cellulitis extends posterior to the orbital septum, a true medical emergency exists. Because of the vision- and life-threatening potential of orbital cellulitis, physicians should be aware of the clinical manifestations of this condition. Treatment should be started as soon as possible and consultation with an ophthalmologist should be obtained promptly.

SLIDE

21

The signs of orbital cellulitis include red and swollen lids and conjunctiva, as seen in the top photograph. Characteristically, ocular motility is impaired and there is pain on eye movement, as seen in the bottom photograph. Because the infection is posterior, the periorbital area may seem relatively uninfamed. The eye may protrude forward because of orbital swelling due to inflammation (proptosis), as seen in the middle photograph. Often the patient with orbital cellulitis will have fever and leukocytosis. Optic nerve involvement is signaled by decreased vision, an afferent pupillary defect, and optic disc edema. Meningitis can result from spreading along the optic nerve.

SLIDE

22

Management of orbital cellulitis should include hospitalization with immediate ophthalmology consultation. An evaluation for infection should include blood culture. Diagnosis can be assisted with an MRI or CT scan of the orbits. If pre-existing sinus disease (frequently associated with orbital cellulites) is present, an ENT consult is indicated.

Disorders of the Ocular Adnexa

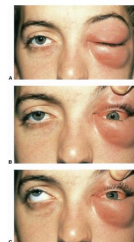


Orbital cellulitis

Disorders of the Ocular Adnexa

ORBITAL CELLULITIS: SIGNS AND SYMPTOMS

- External signs: redness, swelling
- Motility impaired, painful
- ± Proptosis
- Often fever and leukocytosis
- ± Optic nerve: decreased vision, afferent pupillary defect, disc edema



Disorders of the Ocular Adnexa

ORBITAL CELLULITIS: MANAGEMENT

- Hospitalization
- Ophthalmology consult
- Eye consult
- Blood culture
- Orbital CT scan
- ENT consult if pre-existing sinus disease

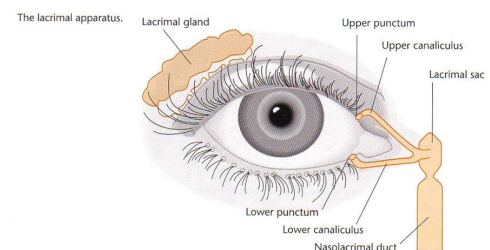
Initiation of treatment with IV antibiotics is urgent and should result in improvement within 24 hours. Specific antibiotics should be chosen as clinically indicated. The most common causative agents of orbital cellulitis are *Staphylococcus aureus*, *Streptococcus* species, and *Haemophilus influenzae*. Diabetic, chronically ill, or immunologically suppressed patients may harbor a rapidly progressive fungal infection, and surgical debridement may be indicated in these cases. Surgery may also be necessary if there is no rapid response to IV antibiotics, or if the MRI or CT scan reveals a subperiosteal abscess. Complications of orbital cellulitis include cavernous sinus thromboses and meningitis.

ORBITAL CELLULITIS: TREATMENT

- IV antibiotics stat: *Staphylococcus*, *Streptococcus*, *H. influenzae*
- Surgical debridement if fungus, no improvement, or subperiosteal abscess
- Complications: cavernous sinus thrombosis, meningitis

LACRIMAL SYSTEM DISORDERS

Another red-eye condition commonly presenting to the primary care physician arises from abnormalities of the tear drainage system. Under normal conditions, tears are produced by the lacrimal gland and drain into the nose by way of lacrimal drainage structures: the puncta, canaliculi, common canaliculus, lacrimal sac, and nasolacrimal duct.



Lacrimal system

Nasolacrimal Duct Obstruction

SLIDE

25

Congenital or acquired obstruction of the nasolacrimal duct produces a characteristic clinical picture of a persistent tearing and occasionally discharge that fails to respond completely to topical antibiotics. A swollen, inflamed lacrimal sac (shown), termed dacryocystitis, may develop. Because secondary infections may arise from a blockage of outflow, definitive treatment depends on relieving the obstruction.

SLIDE

26

Nasolacrimal duct obstruction in the congenital form arises from persistent congenital membranes in the nasolacrimal duct that block the outflow of tears. In such cases, the parent should be taught to compress or massage the lacrimal sac once a day in an attempt to force the contents of the swollen lacrimal sac through distal obstructive membranes and into the nose. Approximately 90% of congenital obstructions will resolve spontaneously by 12 months of age but will only rarely resolve after that age. If tearing and chronic discharge persist beyond 6 to 8 months, the patient should be referred to an ophthalmologist for probing and irrigation of the nasolacrimal duct, which is usually done at 12 months of age. A single probing is curative in the majority of cases. Systemic antibiotics are indicated if dacryocystitis develops.

Lacrimal System Disorders



Dacryocystitis

Lacrimal System Disorders

NASOLACRIMAL DUCT OBSTRUCTION: CONGENITAL

- Massage tear sac daily
- Probing, irrigation, if chronic
- Systemic antibiotics if infected

The most common causes of adult acquired nasolacrimal duct obstruction are trauma and recurrent infection of the lacrimal sac, causing stenosis and scarring. If secondary dacryocystitis is present, systemic antibiotics should be administered during the acute phase. Surgical intervention may be indicated after one episode of dacryocystitis. A surgical procedure to create a fistula between the lacrimal sac and the nose is necessary for recurrent or chronic cases, which rarely respond to medical therapy alone; however, surgery is usually curative.

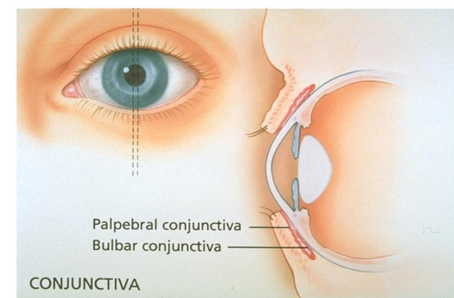
NASOLACRIMAL DUCT OBSTRUCTION: ACQUIRED

- Trauma a common cause
- Systemic antibiotics if infected
- Surgical procedure after one episode of dacryocystitis (dacryocystorhinostomy) prn

OCULAR SURFACE DISORDERS

Conjunctival/Scleral Anatomy

In the normal eye, the conjunctiva forms a smooth, moist lining for the eyelids (the palpebral conjunctiva) and the anterior part of the eyeball (the bulbar conjunctiva). It is transparent tissue containing small blood vessels.



Conjunctivitis

SLIDE

29

When inflamed, both the bulbar and palpebral conjunctival blood vessels become dilated and readily apparent. This contrast is particularly evident if the blood vessels break and bleed. Red eyes attract attention, leading the patient to seek medical advice. A thorough clinical history and examination will allow the primary care physician to establish a diagnosis and treatment plan. An ophthalmologist should be consulted if an infection is suspected and vision is impaired, or the patient fails to respond to therapy in 3 to 4 days.

SLIDE

30

The major causes of primary conjunctivitis in adults are bacteria, viruses, and allergies. A knowledge of the symptoms—itching, for example, is characteristic of allergies—will assist in making a diagnosis.

SLIDE

31

The nature of the discharge, if any, can be helpful in determining the origin of the conjunctivitis. Purulence suggests bacteria; watery, serous discharge is associated with viruses, and watery discharge with stringy, white mucus is characteristic of allergies. Itching is often diagnostic for allergic conjunctivitis. In all cases of red eye, palpate for preauricular lymph nodes, a frequent finding in contagious viral conjunctivitis.

Ocular Surface Disorders



Dilated conjunctival blood vessels

Ocular Surface Disorders

ADULT CONJUNCTIVITIS: MAJOR CAUSES

- Bacterial
- Viral
- Allergic

Ocular Surface Disorders

CONJUNCTIVITIS: DISCHARGE

Discharge	Cause
Purulent	Bacterial
Clear	Viral*
Watery, with stringy; white mucus	Allergic**

* Preauricular lymphadenopathy signals viral infection
** Itching often accompanies

Bacterial Conjunctivitis

SLIDE 32

Staphylococcus species, usually harbored in the skin, are the most common cause of conjunctivitis. *Streptococcus* and *Haemophilus* species, harbored in the respiratory system, are the next most common. Bacteria frequently cause a secondary purulent infection in patients with viral conjunctivitis. All common bacteria may cause conjunctivitis.

SLIDE 33

In the presence of a mild purulent discharge with a clear cornea, the primary care physician may begin treatment. Topical ophthalmic antibiotic solutions, applied 4 times daily, should be prescribed for 7 days. Bacterial conjunctivitis is treated with a broad-spectrum topical antibiotic such as, erythromycin, sulfacetamide, trimethoprim-polymyxin, an aminoglycoside, or a fluoroquinolone. Warm compresses applied several times a day should be included in the treatment regimen. If there is no significant clinical improvement in 3 days, referral to an ophthalmologist is in order.

SLIDE 34

In patients with a copious purulent discharge, *Neisseria gonorrhoeae* should be suspected. A conjunctival swab for stat Gram's stain and culture are in order. Referral to an ophthalmologist is very important because corneal involvement may develop and perforation is possible.

Ocular Surface Disorders

BACTERIAL CONJUNCTIVITIS: COMMON CAUSES

- *Staphylococcus* (skin)
- *Streptococcus* (respiratory)
- *Haemophilus* (respiratory)

Ocular Surface Disorders

BACTERIAL CONJUNCTIVITIS TREATMENT

- Topical antibiotic: qid x 7 days (aminoglycoside, erythromycin, fluoroquinolone, sulfacetamide, or trimethoprim-polymyxin)
- Warm compresses
- Refer if not markedly improved in 3 days

Ocular Surface Disorders

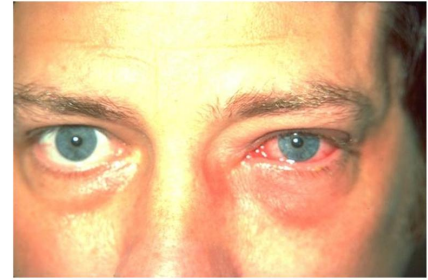


Copious purulent discharge: Suspect *Neisseria gonorrhoeae*.

Viral Conjunctivitis

SLIDE 35

In contrast to bacterial conjunctivitis, viral conjunctivitis produces a discharge that is usually watery. The most common cause of viral conjunctivitis by far is adenovirus.



Viral conjunctivitis

SLIDE 36

Viral conjunctivitis is highly contagious, and hand washing is very important to avoid infection. Infected hospital personnel, daycare workers, food handlers, and those in similar occupations should avoid contact with others. This may necessitate taking up to 2 weeks' time off from work. Palpable preauricular lymph nodes are an important sign differentiating viral from bacterial conjunctivitis. The patient may have an upper respiratory infection, a sore throat, fever, and generalized malaise, or someone in the family may have had these symptoms.

Viral conjunctivitis is a self-limited entity, and no specific treatment is generally indicated. However, if the patient has discomfort or moderate conjunctival chemosis, the patient should be referred to an ophthalmologist. Unfortunately, the condition may last for weeks, although most cases of viral conjunctivitis resolve in 14 to 21 days. If the conjunctivitis or symptoms persist beyond 2 weeks or there is pain, photophobia, or decreased vision, the patient should be referred to an ophthalmologist.

Ocular Surface Disorders

Ocular Surface Disorders

VIRAL CONJUNCTIVITIS

- Watery discharge
- Highly contagious
- Palpable preauricular lymph node
- History of URI, sore throat, fever common

If pain, photophobia, or decreased vision, refer.

Allergic Conjunctivitis

SLIDE 37

Allergic conjunctivitis is characterized by lid or conjunctival edema often associated with a watery discharge and a white, stringy mucus. Itching is the predominant symptom and is sometimes accompanied by burning. The tarsal conjunctiva has a velvety appearance from papillary hypertrophy, and conjunctival chemosis is present.

SLIDE 38

Allergic conjunctivitis frequently occurs in patients with hay fever, asthma, or eczema. Contact allergy is associated with drugs, chemicals, or cosmetics contacting the conjunctiva or eyelids. The offending drug or allergen should be eliminated. Most allergic conditions can be treated symptomatically with topical antihistamines or artificial tears. Patients refractory to local forms of treatment should be referred to an ophthalmologist.

Neonatal Conjunctivitis

SLIDE 39

Neonatal conjunctivitis is an inflammation of the conjunctiva that occurs during the first 4 weeks of life. The timing of the conjunctivitis may be helpful eliciting the etiology. Possible causes include bacteria, such as *Neisseria gonorrhoeae*, *Staphylococcus*, and *Streptococcus*; *Chlamydia*; and viruses, such as herpes. Because some these causes of neonatal conjunctivitis have serious systemic manifestations as well as ocular manifestations, precise diagnosis and treatment are important.

Ocular Surface Disorders



Allergic conjunctivitis

Ocular Surface Disorders

ALLERGIC CONJUNCTIVITIS

- Associated conditions: hay fever, asthma, eczema
- Contact allergy: chemicals, cosmetics, pollen
- Treatment: topical antihistamine/decongestant drops
- Systemic antihistamines if necessary for systemic disease

Refer refractory cases.

Ocular Surface Disorders

NEONATAL CONJUNCTIVITIS: CAUSES

- Bacteria (*N. gonorrhoeae*, 2–4 days)
- Bacteria (*Staphylococcus*, *Streptococcus*, 3–5 days)
- *Chlamydia* (5–12 days)
- Viruses (eg, herpes, from mother)

SLIDE

40

The infant with gonococcal conjunctivitis presents with swollen lids, heavy purulent exudate, “beefy-red” conjunctiva, and conjunctival edema. The gonococcal organism can penetrate the intact corneal epithelium, producing corneal ulceration and perforation if treatment is delayed. When gonococcal conjunctivitis is suspected, referral to an ophthalmologist is urgent. A combination of local and systemic therapy will be necessary.

Ocular Surface Disorders



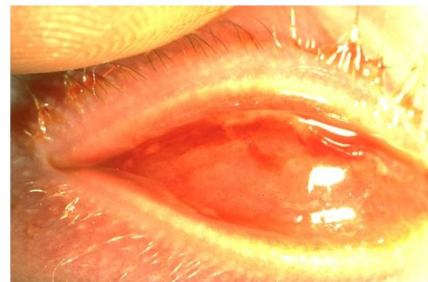
Neonatal gonococcal conjunctivitis

SLIDE

41

Chlamydial infections are a leading cause of neonatal conjunctivitis because of the number of infants exposed to *Chlamydia* during vaginal delivery in infected mothers. The typical picture is a mild, unilateral or bilateral, mucopurulent conjunctivitis, with moderate lid edema and infection. Pneumonitis and otitis media often accompany those ocular findings. Cultures and smears are required to make this diagnosis because it may be impossible to clinically differentiate these conditions from neonatal bacterial conjunctivitis.

Ocular Surface Disorders



Neonatal chlamydial conjunctivitis

SLIDE

42

Chlamydial conjunctivitis is treated with erythromycin ointment, applied 4 times daily for 4 weeks. Oral erythromycin, 40 to 50 mg/kg/day in 4 divided doses, should be given for 2 to 3 weeks. In addition, both parents should be examined and treated as appropriate.

Ocular Surface Disorders

NEONATAL CHLAMYDIAL CONJUNCTIVITIS: TREATMENT

- Erythromycin ointment: qid x 4 weeks
- Erythromycin po x 2–3 weeks
40–50 mg/kg/day ÷ 4

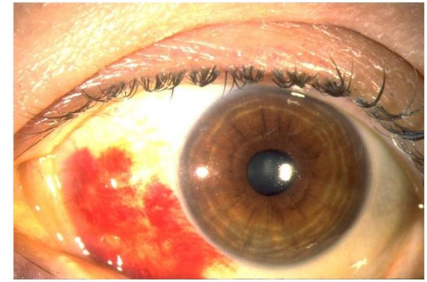
Subconjunctival Hemorrhage

SLIDE
43

This red eye is secondary to subconjunctival hemorrhage. A patient with this condition typically presents with a bright red eye, normal vision, and no pain. Patients may be on anticoagulation, aspirin, or high doses of vitamin E. In some cases, the hemorrhage is preceded by coughing or straining. There is no therapy except reassuring the patient that the condition is not serious, vision is not threatened, and that the blood will clear in 2 to 3 weeks.

Hematologic coagulation studies are usually not indicated unless there are associated retinal hemorrhages. A careful history should confirm that the hemorrhage was not associated with trauma, or that the subconjunctival hemorrhage might conceal the entrance wound of a small perforating foreign body.

Ocular Surface Disorders



Subconjunctival hemorrhage

Dry Eyes

SLIDE
44

Tears, because of their lubricating and bacteriostatic properties, are essential for the maintenance of a healthy cornea and conjunctiva. A deficiency in tear production may result in a dry eye, also known as keratoconjunctivitis sicca, a relatively common condition that may be managed by the primary care physician with frequent instillation of artificial tears.

Patients with severe dry eyes who are not relieved with artificial tears several times a day should be referred for evaluation and possible treatment with intensive use of nonpreserved artificial tears, punctal occlusion, or cyclosporine drops (Restasis).

Ocular Surface Disorders

TEARS AND DRY EYES

- Tear functions:
 - Lubrication
 - Bacteriostatic and immunologic functions
- Dry eye (keratoconjunctivitis sicca) is a tear deficiency state

Symptoms of the dry eye include burning and a foreign-body or “gritty” sensation. Paradoxically, discomfort from dry eyes may stimulate reflex tearing from the lacrimal gland. Symptoms usually exceed the signs of this common condition. Symptoms are made worse by activities that require concentration and subsequently reduce the normal blink reflex of every 3 to 4 seconds, such as reading, using a computer, watching television, or driving. Long airplane flights also cause excessive drying from low humidity.

Dry eyes tend to get worse with advancing age. Tear deficiency states can also be seen in a number of other conditions, such as rheumatoid arthritis. Some conditions that result in loss of conjunctival goblet cells cause dry eye symptoms, although aqueous tear production is normal: Stevens-Johnson syndrome, severe chemical injuries, or ocular pemphigoid. Certain medications, including systemic antihistamines, diuretics, antidepressants, and dermatologic drying agents, make dry eye symptoms worse.

Treatment consists of frequent use of artificial tears and, if needed, a lubricating ophthalmic ointment at bedtime. Nonpreserved artificial tears may provide better relief if patients need to use tears more frequently than every 2 hours during the day. Temporary or permanent occlusion of the lacrimal drainage apparatus may improve the efficacy of the artificial tears. Cyclosporine drops (Restasis), which improve tear production, are an effective treatment in some cases. Patients should be counseled to avoid activities that may increase the severity of dry-eye symptoms. Severe tear deficiency states are best managed by an ophthalmologist because of an increased risk of corneal ulceration.

TEAR DEFICIENCY STATES: SYMPTOMS

- Burning
- Foreign-body sensation
- Paradoxical reflex tearing
- Symptoms can be made worse by reading, computer use, television, driving, lengthy air travel

TEAR DEFICIENCY STATES: ASSOCIATED CONDITIONS

- Aging
- Rheumatoid arthritis
- Stevens-Johnson syndrome
- Chemical injuries
- Ocular pemphigoid
- Systemic medications

DRY EYES: TREATMENT

- Artificial tears, cyclosporine drops
- Nonpreserved artificial tears
- Lubricating ointment at bedtime
- Punctal occlusion
- Counseling about activities that make dry eyes worse

Exposure Keratitis

SLIDE 48

Exposure keratitis causes symptoms similar to dry eyes. Exposure keratitis comes from incomplete eyelid closure during blinking, deficient blinking, or eyes coming open during sleep. Exposure may also result from Bell's palsy, scarred or malpositioned eyelids, or thyroid exophthalmos, as the patient pictured here.



Thyroid exophthalmos: one cause of exposure keratitis

SLIDE 49

Management involves the use of ophthalmic lubricating solutions and ointments. Merely patching the eye is to be avoided because of an increased risk of corneal abrasion if the lids do not cover the eye beneath the patch. However, taping the eyelids shut at night is sometimes useful. Severe cases and those requiring surgical correction, such as a tarsorrhaphy, should be referred to an ophthalmologist.

Ocular Surface Disorders

EXPOSURE KERATITIS: CAUSES AND MANAGEMENT

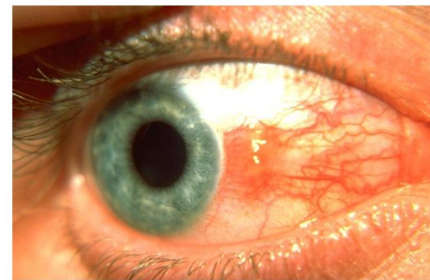
- Due to incomplete lid closure
- Manage with lubricating solutions/ointments
- Tape lids shut at night
- Do not patch
- Refer severe cases

Pinguecula/Pterygium

SLIDE 50

A pinguecula is a benign actinic change in the bulbar conjunctiva at the palpebral fissure due to sunlight exposure and drying. Scar tissue on the conjunctiva becomes red because of increased vascularity of the tissue. Pingueculae are more prevalent closer to the equator, and more common in people who spend time outdoors.

Ocular Surface Disorders



Pinguecula

SLIDE**51**

The extension of this actinic process onto the cornea is called a pterygium. A pterygium is a thin sheet of fibrovascular material that grows most commonly on the nasal side of the cornea. As a pterygium becomes apparent, it frequently becomes red and inflamed when exposed to irritants such as drying or sunlight.

Ocular Surface Disorders



Pterygium

SLIDE**52**

Management of these lesions consists of the use of artificial tears. Patients should be counseled to use artificial tears to avoid dryness, and to wear sunglasses for protection from sun and wind. When inflammation is severe or if a pterygium is actively growing, an ophthalmologist should be consulted. When a pterygium encroaches on the visual axis, or shows active growth, it should be excised. Pterygia can sometimes recur after excision.

Ocular Surface Disorders

INFLAMED PINGUECULA AND PTERYGIUM: MANAGEMENT

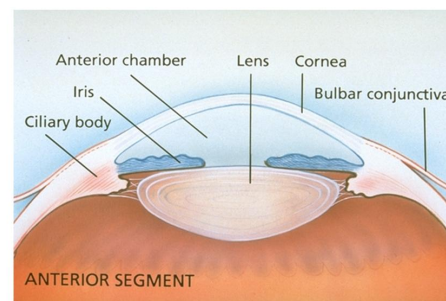
- Artificial tears
- Counsel patients to avoid irritation
- If documented growth or vision loss, refer

ANTERIOR SEGMENT DISORDERS

SLIDE**53**

The anterior segment of the eye is composed of the conjunctiva, cornea, anterior chamber, and iris. Behind the iris, actually visible through the pupil, lies the lens. The ciliary body is a doughnut shaped muscle behind the base of the iris that functions in accommodation and secretes the aqueous. All these structures can cause a red eye.

Anterior Segment Disorders



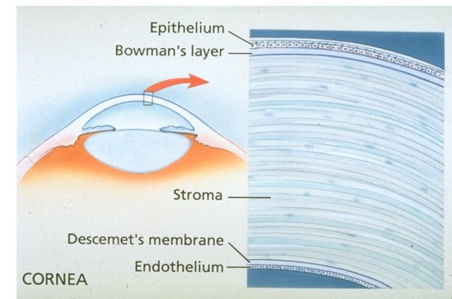
Corneal Anatomy, Symptoms, and Examination

SLIDE

54

The cornea is the transparent tissue in the front of the eye through which light passes into the eye, similar to a watch crystal. The normally smooth, lustrous surface of the cornea is covered by epithelium, which has a texture similar to gelatin and is capable of regeneration in 18 hours. Beneath the epithelium is Bowman's layer, which develops scarring whenever it is damaged. If scarring develops in the visual axis or central cornea, vision is impaired. The corneal stroma is made of collagen and comprises 95% of the corneal thickness. Finally, the internal surface of the cornea consists of Descemet's membrane, the strongest layer of the cornea, on which grows endothelium, a single cell layer which maintains corneal clarity. The endothelium has no regenerative capacity, and damage to the endothelium from injury, inflammation, or high intraocular pressure results in corneal edema.

Anterior Segment Disorders



SLIDE

55

The cornea is the most richly innervated surface tissue in the body, and corneal nerve fibers have reflex connections with the oculomotor nerve branches that supply the circumferential muscles: the pupillary sphincter and the ciliary body. Acute corneal disorders, in addition to causing foreign-body pain, can cause a deep boring pain, photophobia, and blurred vision. Blurring is caused by pupillary miosis from contraction of the sphincter muscle; pain is caused by spasms of the ciliary body.

Anterior Segment Disorders

ACUTE CORNEAL DISORDERS: SYMPTOMS

- Eye pain
 - Foreign-body sensation
 - Deep and boring
- Photophobia
- Blurred vision

SLIDE

56

A slit-lamp biomicroscope is the standard tool for examining the anterior segment. However, in the absence of a slit lamp, the primary care physician will find useful information examining the smoothness and clarity of the corneal surface with a penlight. Note the irregular corneal light reflex and central opacity in this figure.

Anterior Segment Disorders



Irregular corneal light reflex and central corneal opacity

SLIDE

57

Fluorescein dye should be used to detect defects of the corneal epithelium, as seen in abrasions. Here a drop of sterile fluorescein dye strip is being applied to the lower fornix. With blinking, the fluorescein spreads over the cornea. The dye adheres only to defects in the corneal epithelium defect, and defects in the epithelium light up bright yellow-green under cobalt blue light.

Anterior Segment Disorders



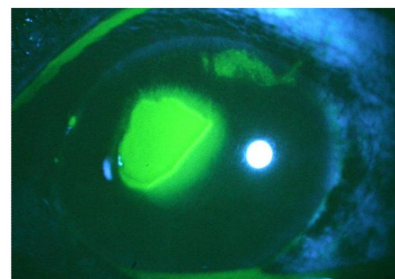
Fluorescein dye strip applied to the conjunctiva

SLIDE

58

A cobalt-blue light source can be employed with a magnifying loupe to enhance visibility. When viewed under blue light, areas of disrupted epithelium stain yellow-green against the black background of the intact epithelium, which does not stain.

Anterior Segment Disorders



Corneal abrasion, stained with fluorescein and viewed with cobalt blue light

Corneal Abrasion

SLIDE

59

A corneal abrasion causes tearing, pain, and photophobia. The patient usually has a foreign-body sensation, but it can be difficult to distinguish between that caused by a foreign body embedded in the cornea and pain due to the epithelial defect made by the foreign body. The epithelial defect produces a foreign body sensation as the lid rubs over it. If the abrasion persists, a deep, severe aching pain develops over time and is considerably worsened by exposure to light. Vision is usually blurred. It is easier for both the doctor and the patient to evaluate the eye after a drop of topical anesthetic ophthalmic solution has been applied to the eye. Again, fluorescein will stain the denuded areas of the cornea. The pupil is often miotic from ciliary body spasm.

Anterior Segment Disorders

CORNEAL ABRASION

- Signs and symptoms: redness, tearing, pain, photophobia, foreign-body sensation, blurred vision, small pupil
- Causes: injury, welder's arc, contact lens overwear

Treatment is designed to foster rapid healing, restore patient comfort, and prevent secondary infections. Abrasions of the corneal epithelium may be managed by the primary care physician with a cycloplegic drop, such as 1% cyclopentolate, to relieve pain caused by ciliary body spasm; topical antibiotic drops (eg, fluoroquinolone, others) or ointment (erythromycin, bacitracin/polymyxin, or others). A pressure patch may be applied, although some physicians advocate no patching. One drop of topical anesthetic may be helpful, although topical anesthetics should never be prescribed for patient use because they are quite toxic to the corneal epithelium.

For patients experiencing severe pain, oral analgesics may be prescribed. The patient should be seen again in 24–48 hours, and failure to heal satisfactorily should be cause for referral to an ophthalmologist.

A pressure patch is achieved by placing two eyepads gently against the eye. The patient is then instructed to keep both eyes closed, while the pressure patch is taped firmly over the affected eye. The lower cheek should be pulled up firmly as tape is applied to keep the eye closed. The patch should remain on the eye for at least 24 hours, and follow-up by an ophthalmologist is indicated if the defect does not heal in 24 hours. A loose patch can do more harm than no patch, so care must be taken to ensure that the lids are securely closed under the patch.

CORNEAL ABRASION: MANAGEMENT

Goals:

- Promote rapid healing
- Relieve pain
- Prevent infections

Treatment:

- 1% cyclopentolate
- Topical antibiotics
 - Drops (eg, fluoroquinolone, others) or ointment (eg, erythromycin, bacitracin/polymyxin)
- ± Pressure patch x 24–48 hours
- ± Oral analgesics



Applying a pressure patch

Chemical Burns

SLIDE

62

A chemical burn to the eye with acid or alkali is a true ocular emergency, requiring 15 to 20 minutes of immediate irrigation with the nearest source of water available at the injury site. Further irrigation may be performed in an emergency center to normalize the pH in the eye. The nature of the chemical will dictate management thereafter.

SLIDE

63

Most acids produce the extent of their damage immediately upon contact. Of course, the more concentrated the acid, the more severe the immediate effect. Severe chemical burns denude the epithelium and blanch the vascular conjunctiva. Acid burns, after irrigation, can be managed like a severe corneal abrasion

SLIDE

64

An alkali burn, shown here, can be more devastating to the eye because the alkaline agent dissolves the corneal tissue and continues to cause damage long after the initial chemical contact. The treating physician needs to ensure all particles of an alkaline agent are removed, or they will continue to release alkali. Following thorough irrigation, refer to an ophthalmologist emergently. Corneal melting or perforation can result from prolonged epithelial defects, and the risk of perforation persists until the epithelium is intact. Glaucoma, cataract, and chronic surface disease can occur as a later complication.

Anterior Segment Disorders

CHEMICAL INJURY

- A true ocular emergency
- Requires immediate irrigation with nearest source of water
- Management depends on offending agent

Anterior Segment Disorders



Chemical burn: acid

Anterior Segment Disorders



Chemical burn: alkali

Contact Lens Overwear

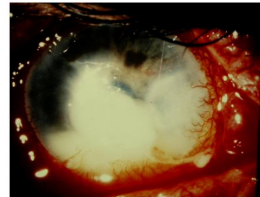
SLIDE

65

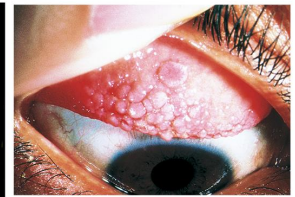
Patients with contact lenses may have symptoms and complications of both conjunctivitis and corneal abrasions. The contact lens can mechanically cause an abrasion and/or introduce an infection to the cornea or conjunctiva. Simple cases of contact lens overwear are managed similarly to corneal abrasion, with care taken to watch for infection. Occasionally, contact lens-induced corneal abrasions, especially those associated with soft lenses, rapidly progress to a severe bacterial corneal ulcer (see figure on left). A more common complication of soft contact lens wear is giant papillary conjunctivitis (GPC; see figure on right). GPC is characterized by hypertrophic papillae on the upper tarsal plate.

Patients with contact-lens related symptoms should be seen again the next day and referred if not improved. Contact lens wear may be resumed only after the corneal epithelium has healed, and patients should be counseled not to wear the contact lens if any symptoms persist.

Anterior Segment Disorders



Corneal ulcer



Giant papillary conjunctivitis

Infectious Keratitis

SLIDE

66

The cornea is subject to two types of injury: Mechanical trauma, such as abrasions and foreign bodies; and chemical trauma, such as acid or alkali burns. Both types of trauma can predispose to corneal infection by disrupting the protective barrier of the corneal epithelium. Because infections can result in permanent scarring and decreased vision, early detection and aggressive therapy are important.

Anterior Segment Disorders

INFECTIOUS KERATITIS

- Frequently result from mechanical trauma
- Can cause permanent scarring and decreased vision
- Early detection, aggressive therapy are vital

Bacterial Keratitis

SLIDE

67

Bacterial infection of the cornea presents as a red, painful eye with purulent discharge, usually associated with decreased vision. Examination by penlight may reveal a discrete white or gray corneal opacity. Emergency referral to an ophthalmologist for diagnosis and treatment is required.

Anterior Segment Disorders



Bacterial infection of the cornea

Viral Keratitis

SLIDE

68

Primary herpes simplex ocular infection usually presents as a unilateral foreign-body sensation with watery discharge. There may be skin vesicles on the lids or enlarged preauricular lymph nodes. The herpes simplex virus resides in the trigeminal ganglia, and recurrent outbreaks of herpetic lesions result from periodic reactivation of the virus.

Anterior Segment Disorders



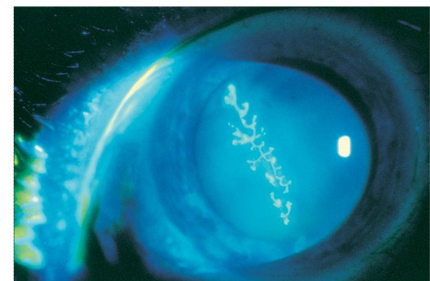
Primary herpes simplex infection

SLIDE

69

Corneal involvement by herpes simplex virus is usually unilateral and typically presents with a red, tearing eye with foreign-body sensation. Epithelial dendrites, characteristic of this condition, are small arborizing epithelial lesions in the shape of a twig or branch. When a corneal dendrite is detected by staining with fluorescein, the patient should be immediately referred to an ophthalmologist.

Anterior Segment Disorders

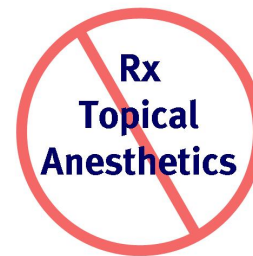


Corneal herpes simplex dendrites, stained with fluorescein

Under no condition should topical anesthetic solutions be given to the patient or prescribed for pain relief. The toxic effects of repeated administration of topical anesthetics on the corneal epithelium can cause permanent scarring and loss of vision. Anesthetic drops should not be prescribed for patients because of this risk.

Additionally, topical steroids should be prescribed only by an ophthalmologist because of their four potentially serious ocular side effects:

- Topical corticosteroid drops can potentiate a latent herpes simplex infection of the cornea. Steroids can also facilitate penetration of the herpes infection to the deeper layers of the cornea, resulting in permanent corneal scarring or perforation.
- Local use of steroids can elevate intraocular pressure in susceptible individuals, possibly effecting steroid-induced glaucoma.
- Topical corticosteroid drops over time can cause cataracts to progress faster than usual.
- The misuse of steroids is capable of potentiating the development of fungal ulcers of the cornea.



TOPICAL STEROIDS: SIDE EFFECTS

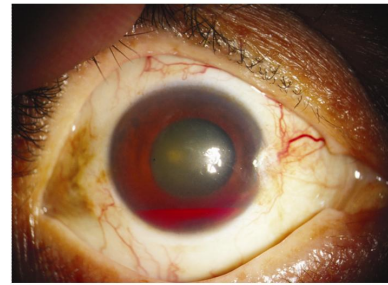
- Facilitate corneal penetration of herpes virus
- Elevate IOP (steroid-induced glaucoma)
- Cataract formation and progression
- Potentiate fungal corneal ulcers

Hyphema

SLIDE
72

Blunt trauma to the eye can cause injury to the iris, anterior chamber angle, or ciliary body and result in a hyphema. Blood in the anterior chamber can layer out if the patient has been relatively immobile, or if the patient is active, it can be stirred up and obliterate a clear view of the iris. Vision is usually decreased, and pain and redness may be present. The patient shown here has maintained an upright position, and the red blood cells have settled in the eye. A hyphema is an ocular emergency, and the patient should be referred immediately to an ophthalmologist.

Anterior Segment Disorders



Hyphema

Inflammatory Conditions

SLIDE
73

Inflammation in the eye includes diseases such as episcleritis, scleritis, and uveitis (or iritis). These diseases typically have an autoimmune component and occasionally may be associated with systemic disease. Treatment is usually with topical or oral corticosteroids or other anti-inflammatory drugs.

Anterior Segment Disorders

INFLAMMATORY CONDITIONS CAUSING A RED EYE:

- Episcleritis
- Scleritis
- Anterior uveitis (iritis)

SLIDE

74

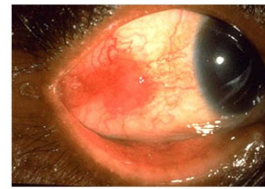
Episcleritis and scleritis are inflammatory conditions that present with eye pain and redness. Both conditions have several variants and can present with sectoral, diffuse, or nodular inflammation. Episcleritis is an inflammation of the superficial episcleral vessels and usually causes relatively mild ocular discomfort. Although episcleritis can be associated with systemic autoimmune disorders, it is most commonly idiopathic. Scleritis is an inflammation of the sclera and deeper episcleral vessels and is often associated with more severe pain. An underlying autoimmune disorder can be found in up to 50% of patients with scleritis, most commonly rheumatoid arthritis. Although episcleritis often can be managed with topical steroids or nonsteroidal drops, patients with scleritis often require additional systemic anti-inflammatory treatment with oral nonsteroidal anti-inflammatory drugs, oral steroids, or in some cases, other immunosuppressive agents.

SLIDE

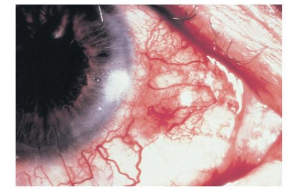
75

A patient with iritis may present with circumlimbal redness, pain, photophobia, and decreased vision. The pupil is usually smaller than the contralateral eye due to ciliary body spasm. Iritis frequently accompanies other inflammatory conditions, including infections, arthritis, and sarcoidosis, urethritis, and bowel disorders. Iritis may also occur as a result of blunt trauma to the eyes. In such cases, signs and symptoms usually begin one to several days following trauma.

Anterior Segment Disorders



Episcleritis



Scleritis

Anterior Segment Disorders

IRITIS

Signs and Symptoms

- Circumlimbal redness
- Pain
- Photophobia
- Decreased vision
- Miotic pupil

Rule Out

- Systemic inflammation
- Trauma
- Autoimmune disease
- Systemic infection

Recognize and refer.

SLIDE
76

Uveitis can be very painful, and the pain does not always localize to the eye. Frequently the pain is a boring deep pain like an "ice cream" headache that feels like it is coming from behind the eye. Untreated or improperly treated iritis can be complicated by the development of glaucoma and cataracts. Early recognition of this clinical picture and prompt referral are essential.

Acute uveitis is characterized by white blood cells in the anterior chamber. These cells are generally best seen with slit-lamp biomicroscopy of the anterior chamber. In severe cases, the cells may collect in the inferior portion of the anterior chamber and form a hypopyon. In cases of chronic uveitis, white blood cells may collect on the corneal endothelial surface and form keratic precipitates sometimes called "mutton fat."

UVEITIS: SLIT LAMP FINDINGS



A. White cells in anterior chamber

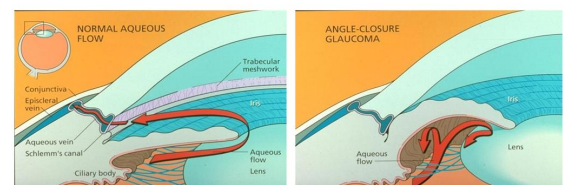
B. Hypopyon

C. Keratic precipitates

Acute Angle-Closure Glaucoma

SLIDE
77

In the normal eye, aqueous humor flows through the pupil into the anterior chamber where it is drained primarily through the trabecular meshwork to a canal leading to the venous system (left). Acute elevations in intraocular pressure can occur when the peripheral iris occludes the trabecular meshwork in the angle and suddenly blocks the outflow of aqueous humor from the anterior chamber (right). Such an attack may occur following dilation of the pupil in dim lighting or an instillation of dilating eye drops. Even emotional stress or systemic medications that dilate the pupil can sometimes trigger an attack in susceptible individuals.



The pain of angle-closure glaucoma is among the worst the body can experience. Patients experiencing an acute attack of angle-closure glaucoma complain of severe ocular pain, frontal headache, blurred vision, and the appearance of halos around lights. Nausea and vomiting are often present. Generally, the symptoms are displayed in one eye only, although both eyes are usually predisposed to this condition.

The easiest way to rule out angle-closure glaucoma is to check the intraocular pressure. Although most primary care physicians are not familiar with these techniques, the availability of a tonometer such a Schiøtz or TonoPen in patient-care settings where angle-closure glaucoma might be encountered would make diagnosis easier. In the absence of these tools, a penlight examination of the affected eye would reveal a pupil fixed in mid-dilation and slightly larger than the contralateral pupil; a responsive pupil during acute angle closure would be unusual. Often the cornea appears hazy or “steamy” due to edema

An acute episode of angle-closure glaucoma is an ocular emergency and requires immediate intervention. Beware of the trap of confusing this uncommon ophthalmic entity with a cerebral aneurysm (which is accompanied by headaches and a fixed, dilated pupil) or with abdominal pathology (symptoms of which include nausea, vomiting, and usually abdominal pain), because evaluation of these entities only delays the needed ophthalmic treatment.

ACUTE GLAUCOMA: SIGNS AND SYMPTOMS

- Red eye
- Severe pain in, around eye
- Frontal headache
- Blurred vision, halos seen around lights
- Nausea, vomiting
- Pupil fixed, mid-dilated, slightly larger than contralateral side
- Elevated IOP
- Corneal haze



Acute angle-closure glaucoma

If an ophthalmologist cannot attend a patient with acute angle-closure glaucoma within the hour, the primary care physician should initiate treatment. This should include administering topical 2% pilocarpine drops in two doses, 15 minutes apart. Topical timolol maleate 0.5%, a beta blocker, and topical apraclonidine 0.5%, an alpha-adrenergic agonist, may also be administered. Systemically, acetazolamide, 500 mg orally or parenterally, should be given. A 20% solution of IV mannitol is sometimes necessary. The longer the intraocular pressure remains high, the greater the risk of permanent visual loss. Improved comfort suggests that the pressure is becoming lower, as do the return of pupillary movement and the resolution of stromal edema.

ACUTE GLAUCOMA: INITIAL TREATMENT

- Pilocarpine 2% drops q 15 min x 2
- Timolol maleate 0.5%, 1 drop
- Apraclonidine 0.5%, 1 drop
- Acetazolamide 500 mg po or IV
- IV mannitol 20% 300–500 cc

SUMMARY

To summarize, many conditions may present with a red eye or red lid. Hordeolum, chalazion, blepharitis, conjunctivitis, subconjunctival hemorrhage, dry eyes, and corneal abrasions can usually be diagnosed easily and treated by the primary care physician.

COMMON RED EYE DISORDERS: TREATMENT INDICATED

- Hordeolum
- Chalazion
- Blepharitis
- Conjunctivitis
- Subconjunctival hemorrhage
- Dry eyes
- Corneal abrasions (most)

SLIDE

82

However, when the physician notes decreased vision, ocular pain, photophobia, circumlimbal redness, corneal edema, corneal opacities or dendrites, or an abnormal pupil, the patient should be referred to an ophthalmologist.

SLIDE

83

Orbital cellulitis, episcleritis, scleritis, chemical injury, corneal infection, hyphema, iritis, and acute angle-closure glaucoma are urgent conditions that threaten vision and require immediate referral to an ophthalmologist.

SLIDE

84

In conclusion, the successful management of the red eye depends on the clinical expertise of the primary care physician and close cooperation and communication between the primary care physician and the ophthalmologist. Early diagnosis and treatment can reduce patient morbidity, and reduce the chance of permanent vision loss.

Summary

VISION-THREATENING RED EYE SIGNS & SYMPTOMS: REFERRAL INDICATED

- Decreased vision
- Ocular pain
- Photophobia
- Circumlimbal redness
- Corneal edema
- Corneal ulcers/ dendrites
- Abnormal pupil
- Elevated IOP

Summary

VISION-THREATENING RED EYE DISORDERS: URGENT REFERRAL

- Orbital cellulitis
- Scleritis
- Chemical injury
- Corneal infection
- Hyphema
- Iritis
- Acute glaucoma

Summary

MANAGING THE RED EYE: PCP AND OPHTHALMOLOGIST

- Clinical expertise
- Cooperation
- Communication



APPENDIX 1

Common Red Eye Disorders: Diagnosis and Management

I. Ocular Adnexa

- A. Hordeolum/chalazion:** Inflamed glands of lid due to occluded orifices of Meibomian glands (often complicates blepharitis)
1. Symptoms/signs: may present as localized or diffuse cellulitis of lid, associated with tenderness
 2. Treatment
 - a. Treat blepharitis if present
 - b. Warm compresses for 10 mins tid when acute or subacute; continue until resolved (may take several weeks)
 - c. Refer to ophthalmologist if chalazion fails to resolve and becomes chronic, ie, nontender, localized
- B. Blepharitis:** A chronic lid margin inflammation
1. Associated with:
 - a. Staphylococcal infection
 - b. Seborrhea
 - c. Dry eyes
 2. Symptoms/signs
 - a. Burning
 - b. Foreign-body sensation
 - c. Thick, red lid margins with crusting
 - d. Lids often sticking in AM
 - e. May be asymptomatic
 3. Treatment
 - a. Warm compresses to loosen crusting
 - b. Proper lid hygiene: scrub lids thoroughly with warm washcloth, plus nonirritating shampoo in AM and hs
 - c. Topical ophthalmic antibiotic ointment hs x 2–3 weeks (eg, erythromycin) or antibiotic/steroid ointment
 - d. Oral antibiotics (tetracycline or erythromycin) in refractory cases only
- C. Cellulitis of extraocular structures**
1. Anterior (periorbital or preseptal) cellulitis
 - a. Symptoms/signs
 - i. Swollen, red lids and skin
 - ii. Lids may be tender
 - iii. Vision, pupils, ocular motility are normal
 - b. Treatment
 - i. Warm compresses
 - ii. Systemic antibiotics
 2. Posterior (orbital) cellulitis
 - a. Symptoms/signs
 - i. Swollen, red lids and conjunctiva
 - ii. Periorbital area relatively uninflamed

- iii. Impaired ocular motility with pain on eye movement
- iv. Proptosis
- v. If optic nerve involvement: decreased vision, afferent pupillary defect, optic disc edema
- b. Management
 - i. Hospitalization
 - ii. Stat ophthalmology consultation
 - iii. Blood culture
 - iv. Orbital CT scan
 - v. ENT consultation if sinus disease present
 - vi. IV antibiotics stat (*Staphylococcus aureus*, *Streptococcus* species, *Haemophilus influenzae* most common)
 - vii. Rule out fungal infection in immunosuppressed patient (may require surgical debridement)
 - viii. Surgery if no rapid response to IV antibiotics or if subperiosteal abscess present
 - ix. Watch for complications: cavernous sinus thrombosis, meningitis

II. Lacrimal System

A. Nasolacrimal duct obstruction

1. Symptoms/signs
 - a. Persistent tearing and discharge, often associated with a red eye
 - b. ± Dacryocystitis (infected tear sac)
2. Treatment: congenital obstruction
 - a. Massage lacrimal sac daily
 - b. Systemic antibiotics if dacryocystitis
 - c. Refer to ophthalmologist if no resolution in 6–8 months
3. Acquired obstruction
 - a. Systemic antibiotics if dacryocystitis
 - b. Chronic/recurrent: Refer to ophthalmologist

III. Ocular Surface

A. Conjunctivitis (adult)

1. Symptoms/signs
 - a. Pattern of redness: palpebral or diffuse
 - b. Discharge: characteristic of cause
 - i. Purulent: bacterial
 - ii. Watery, serous: viral
 - iii. Watery, with white, stringy mucus: allergic
2. Bacterial conjunctivitis
 - a. Most common: *S. aureus*, *Streptococcus* species, *H. influenzae*
 - b. Treatment
 - i. Warm compresses
 - ii. Topical antibiotics qid x 7 days
 - iii. Refer to ophthalmologist if not improved in 3 days
 - c. Copious purulent discharge
 - i. Stat Gram's stain, culture (rule out *N. gonorrhoeae*)
 - ii. Refer to ophthalmologist
3. Viral conjunctivitis
 - a. Contagious (adenovirus)

- b. No effective therapy except time (1½–6 weeks)
 - c. Refer to ophthalmologist if pain, photophobia, decreased vision or if condition persists 2+ weeks
- 4. Allergic conjunctivitis
 - a. Itching, burning eyes
 - b. ± Lid/conjunctival edema
 - c. ± White, stringy mucus
 - d. Treatment: symptomatic
 - i. Topical antihistamines or artificial tears
 - ii. Refer if refractory to treatment
- B. Conjunctivitis (neonatal):** culture and smear to differentiate types
 - 1. Bacterial
 - a. "Beefy redness" indicates *N. gonorrhoeae*; refer urgently
 - 2. Chlamydial
 - a. Mild unilateral or bilateral mucopurulence
 - b. Moderate lid edema and infection
 - c. Erythromycin ointment: qid x 4 weeks
 - d. Erythromycin po x 2–3 weeks 40–50 mg/kg/day ÷ 4
- C. Subconjunctival hemorrhage**
 - 1. Usually spontaneous, without known cause
 - 2. Possible association with anticoagulants, aspirin, or high-dose vitamin E
 - 3. Patient often presents with bright red eye, normal vision, no pain
 - 4. Examine carefully to rule out traumatic cause (perforating injury)
 - 5. No treatment except time (2–3 weeks) and reassurance
- D. Dry eyes**
 - 1. Tear deficiency (keratoconjunctivitis sicca)
 - a. Burning, "gritty" sensation (symptoms exceed signs)
 - b. Common with aging
 - c. Associated conditions
 - i. Rheumatoid arthritis; Stevens-Johnson syndrome; ocular pemphigoid; systemic medications (diuretics, antihistamines, antidepressants, dermatologic drying agents)
 - d. Treatment
 - i. Artificial tears instilled frequently or cyclosporine drops
 - ii. Lubricating ophthalmic ointment hs
 - iii. ± Punctal occlusion
 - e. If severe or unresponsive to simple measures, refer to an ophthalmologist
 - 2. Exposure keratitis
 - a. Causes: Bell's palsy, scarred or malpositioned lids, thyroid exophthalmos
 - b. Treatment (if inflamed)
 - i. Artificial tears, lubricating ointment
 - ii. Tape lids shut hs prn; do not patch
 - iii. Refer if severe
- E. Pinguecula/pterygium:** A benign actinic change caused by exposure to sun, wind
 - 1. Arises from bulbar conjunctiva at palpebral fissure (nasal and/or temporal)
 - 2. Pinguecula: confined to conjunctival tissue
 - 3. Pterygium: extension onto the cornea-
 - 4. Treatment
 - a. Frequent use of artificial tears
 - b. Topical ophthalmic solutions with vasoconstrictors qid prn to alleviate redness
 - c. Refer to ophthalmologist if actively growing pterygium is present or if inflammation is severe

IV. Anterior Segment

A. Corneal abrasion

1. Symptoms/signs: redness, tearing, photophobia, pain; foreign-body sensation initially; blurred vision
2. Treatment
 - a. Relieve pain with cycloplegic drops (1% cyclopentolate, 5% homatropine); oral analgesics with codeine if severe pain
 - b. Prevent infection with topical antibiotic
 - c. Promote rapid healing with pressure patch (2 eye pads) for at least 24 hours
3. Refer to ophthalmologist in 24–48 hours if not healed

B. Chemical injury

1. Acid
 - a. Causes immediate damage
 - b. Stat irrigation
 - c. Refer to ophthalmologist
2. Alkali
 - a. Causes immediate and delayed damage; potential for serous ocular damage
 - b. Stat irrigating
 - c. Stat referral to ophthalmologist

C. Contact lens overwear

1. Treat the same as corneal abrasion, but avoid patching if soft contact lens wearer
2. Watch for development of corneal ulcer or GPC

D. Keratitis

1. Viral: herpes simplex type I most common
 - a. Symptoms/signs
 - i. Red eye with watery discharge and foreign-body sensation
 - ii. Dendrite or branching figure, characteristic epithelial lesion of cornea; best seen with fluorescein stain
 - b. Refer to ophthalmologist stat
2. Bacterial
 - a. Symptoms/signs
 - i. Red, painful eye with purulent discharge and decreased vision
 - ii. Discrete corneal opacity seen with penlight
 - b. Refer to ophthalmologist stat

E. Hyphema: Blood in the anterior chamber

1. Usually follows blunt trauma
2. Symptoms/signs: decreased vision, pain, redness, blood in the anterior chamber
3. Refer to ophthalmologist stat

F. Episcleritis/scleritis

1. Localized redness and tenderness but diffuse variations
2. Most cases are idiopathic
3. ± Associated conditions: autoimmune disorders, eg, rheumatoid arthritis
4. Scleritis can lead to vision-threatening complications
5. Always refer to an ophthalmologist

G. Iritis: Inflammation of the anterior chamber

1. Symptoms/signs: circumlimbal redness, eye pain, ± boring headache, photophobia, decreased vision, and small pupil; hypopyon, keratic precipitates
2. ± Associated conditions: infections, arthritis, sarcoidosis, and urethritis, inflammatory bowel disorders.
3. Onset following blunt trauma to eye, usually delayed 1–3 days

4. Complications: glaucoma and cataract
5. Recognize and refer to an ophthalmologist promptly

H. Acute angle-closure glaucoma: Sudden block of aqueous outflow

1. Characteristically seen in susceptible individuals who experience acute rise in IOP when pupil dilates
2. Predicating factors: dim light, some pharmacologic agents (topical and systemic), emotional stress
3. Symptoms
 - a. Severe ocular pain
 - b. Frontal headache
 - c. Blurred vision
 - d. Perception of halos around lights
 - e. ±Nausea and vomiting
4. Signs
 - a. Redness
 - b. Mid-dilated, nonreactive pupil
 - c. Cloudy cornea
 - d. Affected eye appreciably hard on palpation
 - e. Usually one eye is involved
5. Can be confused with other conditions, eg, cerebral aneurysm (headache, fixed dilated pupil), appendicitis (nausea, vomiting)
6. Refer to ophthalmologist stat
7. If treatment by ophthalmologist is to be delayed by 1 hour or more, primary care physician should begin treatment:
 - a. 2% pilocarpine eye drops q 15 mins x 2
 - b. Timolol maleate 0.5%, 1 drop
 - c. Apraclonidine 0.5%, 1 drop
 - d. Acetazolamide 500 mg po or IV
 - e. ±20% solution IV mannitol

V. Vision-Threatening Red Eye Disorders

A. Symptoms/signs

1. Decreased vision
2. Ocular pain
3. Photophobia
4. Circumlimbal redness
5. Corneal edema
6. Corneal ulcers, dendrites
7. Abnormal pupil
8. Proptosis
9. Elevated intraocular pressure

B. Conditions: Recognize and refer

1. Orbital cellulitis
2. Episcleritis, scleritis
3. Chemical injury
4. Corneal infection
5. Hyphema
6. Iritis
7. Acute glaucoma

APPENDIX 2

The Red Eye: Differential Diagnosis

	CONJUNCTIVITIS	IRITIS	KERATITIS (CORNEAL INFLAMMATION OR FOREIGN BODY)	ACUTE ANGLE- CLOSURE GLAUCOMA
VISION	Normal or intermittent Blurring that clears on blinking	Slightly blurred	Slightly blurred	Marked blurring
DISCHARGE	Usually significant, with crusting of lashes	None	None to mild	None
PAIN	None or minor and superficial	Moderately severe: aching and photophobia	Sharp, severe foreign-body sensation	Very severe, frequently nausea and vomiting
PUPIL SIZE	Normal	Constricted	Normal or constricted	Fixed, dilated
CONJUNCTIVAL INJECTION	Diffuse	Circumcorneal	Circumcorneal	Diffuse, with prominent circumcorneal injection
PUPILLARY RESPONSE TO LIGHT	Normal	Minimal further constriction	Normal	Usually no reaction of mid-dilated pupil
INTRAOCULAR PRESSURE	Normal	Normal to low	Normal	Markedly elevated to touch
APPEARANCE OF CORNEA	Clear	Clear or slightly hazy	Opacification present; altered light reflex; positive fluorescein staining	Hazy; altered light reflex
ANTERIOR CHAMBER DEPTH	Normal	Normal	Normal	Shallow

*SPECIAL NOTE ON ACUTE ANGLE-CLOSURE GLAUCOMA: It is highly desirable for an ophthalmologist to examine the patient during an acute attack to confirm the diagnosis.

APPENDIX 3

Resources

Basic and Clinical Science Course, Section 7: *Orbit, Eyelids, and Lacrimal System*. San Francisco: American Academy of Ophthalmology; (updated annually).

Basic and Clinical Science Course, Section 8: *External Disease and Cornea*. San Francisco: American Academy of Ophthalmology; (updated annually).

Basic and Clinical Science Course, Section 9: *Intraocular Inflammation and Uveitis*. San Francisco: American Academy of Ophthalmology; (updated annually).

Bradford, Cynthia A, ed: *Basic Ophthalmology for Medical Students and Primary Care Residents*. 8th ed. San Francisco: American Academy of Ophthalmology; 2004.

Blepharitis (Preferred Practice Pattern). San Francisco: American Academy of Ophthalmology; 2003.

Bacterial Keratitis (Preferred Practice Pattern). San Francisco: American Academy of Ophthalmology; 2000.

Conjunctivitis (Preferred Practice Pattern). San Francisco: American Academy of Ophthalmology; 2003.

Dry Eye Syndrome (Preferred Practice Pattern). San Francisco: American Academy of Ophthalmology; 2003.

Trobe, Jonathan D: *The Physician's Guide to Eye Care*. 3rd ed. San Francisco: American Academy of Ophthalmology; 2006.