

Urgencies and Emergencies of the Anterior Segment

(1 Hour)

Caroline B. Pate, OD, FAAO
The University of Alabama at Birmingham School of Optometry
1716 University Boulevard
Birmingham, AL 35294
205-996-6635
cbeesley@uab.edu

Abstract

This course covers clinical presentations involving urgencies and emergencies of the anterior segment. Recognition, patient evaluation, proper management, and referral pearls for each of the emergency scenarios will be covered.

Learning Objectives

1. Differentiate ocular urgencies from true ophthalmic emergencies presenting with a painful red eye.
2. Recognize the clinical features of common traumatic and non-traumatic anterior segment emergencies, including corneal injury, hyphema, chemical burns, acute angle-closure glaucoma, and endophthalmitis.
3. Develop evidence-based initial management plans for common anterior segment emergencies and traumatic ocular injuries.
4. Be able to counsel patients regarding treatment, activity restrictions, follow-up, and potential complications.

I. Introduction

- A. Urgency vs. Emergency
- B. Categories of painful, red eyes
 1. Infections (i.e., herpes, ulcers)
 2. Inflammation (i.e., uveitis, scleritis)
 3. Injuries/Trauma (i.e., foreign bodies, abrasions, chemical injuries)
 4. Endophthalmitis
 5. Acute angle closure glaucoma

II. Endophthalmitis

- A. Severe inflammation of tissues inside the eye caused by an infection, typically following eye surgery or an injection
- B. Exogenous vs. Endogenous
- C. Signs/Symptoms
 - 1. marked redness
 - 2. pain
 - 3. rapid reduction in VA
 - 4. photophobia
 - 5. swollen eyelids
 - 6. discharge
 - 7. hypopyon/vitritis
- D. Evaluation
 - 1. Obtain careful history – recent surgery, injection, penetrating trauma?
 - 2. Measure VA
 - 3. Slit lamp examination
 - 4. DFE when possible, B-scan if unable to visualize posterior segment
 - 5. Differential diagnosis: Toxic Anterior Segment Syndrome (TAAS)
- E. Management
 - 1. True ophthalmic emergency – immediate retina referral
 - 2. Do not delay referral for topical treatment
 - 3. Vitreous/Aqueous cultures
 - 4. Intravitreal broad-spectrum antibiotics
 - 5. Pars plana vitrectomy when indicated (Endophthalmitis Vitrectomy Study)
 - 6. Systemic antibiotics in select cases (especially endogenous endophthalmitis)

III. Acute Angle Closure Glaucoma

- A. Symptoms
 - 1. Severe pain
 - 2. Decreased vision
 - 3. Colored halos around lights
 - 4. Headache
 - 5. Nausea/Vomiting
 - 6. Sudden onset
- B. Signs
 - 1. Elevated IOP (often >40-50mmHg)
 - 2. Diffuse corneal edema

3. Mid-dilated, poorly reactive pupil
 4. Ciliary flush
 5. Shallow A/C
 6. Closed angle on gonioscopy (compression gonioscopy can be helpful to determine appositional vs. synechial closure)
- C. Management
1. Initiate IOP lowering therapy immediately (topical B-blockers, alpha-agonists, CAIs, ROCK inhibitors)
 2. Oral IOP-lowering with acetazolamide 500mg (unless contraindicated).
 3. Definitive treatment:
 - a. Laser peripheral iridotomy (affected eye)
 - b. Prophylactic laser peripheral iridotomy of fellow eye
- D. Topiramate and risk for bilateral secondary angle-closure glaucoma

IV. Ocular Trauma

- A. Types of Trauma
1. Mechanical
 - a. superficial corneal and conjunctival abrasions
 - b. foreign bodies
 - c. blunt and penetrating injuries
 2. Chemical
 3. Thermal
 4. Combination
- B. Terminology (Reference: Ophthalmol Clin North Am. 2002 Jun;15(2):139-43)
1. Eyewall: sclera and cornea
 2. **Closed Globe Injury:** no full-thickness wound of the eyewall
 - a. Contusion: tissue damage created by energy of blunt force trauma
 - b. Lamellar laceration: partial-thickness wound of eyewall, created by a sharp object
 3. **Open Globe Injury:** full-thickness wound of the eyewall
 - a. Laceration: full-thickness wound of eyewall, caused by sharp object ("outside-in")
 - i. Penetrating injury: entrance wound only

- ii. Intraocular foreign body (IOFB)
- iii. Perforating Injury: entrance and exit wounds; both caused by same agent
- b. Rupture: full-thickness wound of eyewall caused by blunt object; eyewall yields at weakest point to momentary ↑IOP ("inside-out")

V. Corneal Abrasion

A. Signs

- 1. epithelial defect that stains with fluorescein
 - a. abrasion represents basal epithelial cell loss from the basement membrane
 - b. if Bowman's is breached → scarring
- 2. conjunctival injection
- 3. ± corneal edema
- 4. ± swollen eyelid
- 5. ± mild anterior chamber reaction

B. Symptoms

- 1. pain
- 2. foreign body sensation
- 3. tearing
- 4. history of trauma
 - a. thoroughly investigate this
- 5. blepharospasm

C. Evaluation

- 1. slit lamp examination
 - a. measure and document size of abrasion
 - b. rule out corneal diseases (e.g. HS, microbial keratitis)
 - c. rule out penetrating trauma
- 2. upper eyelid eversion

D. Management

- 1. debride loose edges of epithelium
- 2. topical antibiotic
 - a. if contact lens wearer make sure there is coverage against *Pseudomonas*
- 3. ± cycloplegic agent
- 4. ± bandage contact lens
 - a. avoid in certain circumstances
- 5. rarely but pressure patch is an option

6. ± amniotic membrane
7. ± topical NSAID
 - a. review
8. ± oral pain management
 - a. review
 - b. remember no more than 1 g APAP/4hrs or 4 g / day
9. ± hypertonic
10. ± lubricants
11. follow-up
 - a. next day if pressure patch or bandage CL
 - b. if large or if patient was CL wearer – RTC 1 day
 - c. if small abrasion – RTC 2-5 days later
12. patient is at risk of RCE
 - a. Educate!

VI. Conjunctival Laceration

- A. Symptoms
 1. mild pain
 2. red eye
 3. foreign body sensation
 4. usually a history of trauma
- B. Signs
 1. fluorescein staining of the conjunctiva
 2. conjunctiva may be rolled up
 3. sclera may be viewed
 4. often have subconjunctival hemorrhage(s)
- C. Evaluation
 1. ensure globe is intact
 2. rule out foreign matter
- D. Management
 1. small lamellar lacerations may be managed with antibiotic ointment and pressure patch
 2. larger lamellar lacerations may need to be glued or sutured

VII. Corneal or Conjunctival Laceration

- A. True ocular emergency
- B. Signs: +Seidels, Shallow A/C, Low IOP
- C. Management
 1. Do not apply pressure to the globe
 2. Place protective shield over affected eye

3. Have patient avoid ocular movement
 - a. EOM contractions can cause extrusion of intraocular contents
4. NPO - Obtain stat ophthalmology consultation
5. Administer antiemetic and analgesic medication
6. Tetanus immunization or booster

VIII. Corneal Foreign Bodies

- A. Symptoms
 1. foreign body sensation
 2. red eye
 3. tearing
 4. history of trauma
- B. Signs
 1. foreign body with or without rust ring
 - a. may have mild edema and/or infiltrate around foreign matter
 2. conjunctival injection
 3. $\pm$ lid edema
 4. $\pm$ anterior chamber reaction
- C. Evaluation
 1. History
 - a. Obtain a thorough history inquiring if the foreign body (FB) was projectile in nature (e.g. grinding, metal striking metal). If this is the case, one must rule out the presence of an intraocular FB.
 2. Check distance visual acuities. It may be necessary to instill a topical anesthetic if the patient is in significant discomfort.
 3. Inspect the anterior segment to locate the corneal FB and to determine the depth. If the FB is deeper than the epithelium, warn the patient of the potential for scarring.
 4. Evert the lids, inspecting the fornices for additional matter
 - a. double lid eversion as indicated
 5. rule out other pathology
 6. rule out intraocular foreign body
 7. dilate!!
 8. B-scan or CT scan?
- D. Management
 1. Instill proparacaine 0.5% in BOTH eyes
 2. Can foreign body be irrigated?

3. Remove the foreign body with a spud or a 25 gauge needle
4. A flexible nylon loop is useful for children and uncooperative patients
5. A moistened cotton swab is useful to sweep the fornices but is a poor choice for FB removal
6. Irrigate the eye to remove debris
7. Instill a cycloplegic agent
8. Evaluate the fundus to rule out an intraocular FB
9. Manage at this point like a corneal abrasion
10. rust ring
 - a. Alger brush
 - b. may need more than one attempt
11. not all matter needs removed

IX. Hyphema

- A. Symptoms
 1. pain
 2. blurry vision
 3. history of blunt trauma
- B. Signs
 1. blood in anterior chamber
 2. grading:
 - a. Microhyphema – circulating RBC but no layering
 - b. Grade 1 – layered blood < 1/3 of the anterior chamber
 - c. Grade 2 – blood filling 1/3 to 1/2 of the anterior chamber
 - d. Grade 3 – blood filling 1/2 to less than complete
 - e. Grade 4 – complete filling of the anterior chamber
- C. Evaluation
 1. history
 2. thorough ocular examination
 3. may need to obtain B-scan
 4. defer gonioscopy at this time
 5. ± screen for sickle cell (AA; Mediterranean)
- D. Management
 1. bed rest
 - a. head elevated to 30°
 2. fox shield
 3. atropine 1% tid

4. prednisolone acetate 1% or difluprednate 0.05%
5. glaucoma medication if elevated IOP (aqueous suppressants)
6. no ASA or NSAIDs
7. Tylenol prn
8. hospitalized patients:
 - a. aminocaproic acid
 - i. antifibrinolytic
 - ii. poorly tolerated
 - b. comparable:
 - i. oral prednisone 40 mg qd x 5 days
9. RTC daily
10. once resolved → 1 month later perform gonioscopy
11. pupil may remain irregular

X. Orbital Blowout Fracture

- A. Symptoms
 1. pain
 2. local tenderness
 3. diplopia
 4. eyelid swelling
 5. history of trauma
- B. Signs
 1. restricted motilities
 2. hypoesthesia (infraorbital)
 3. crepitus
 4. ± enophthalmos
- C. Evaluation
 1. Look for EOM restrictions
 2. Check for reduced infraorbital sensitivity
 3. palpate for crepitus
 4. evaluate to rule out other ocular sequelae
 - a. subconjunctival hemorrhage
 - b. laceration
 - c. abrasion
 - d. anterior uveitis
 - e. hyphema
 - f. retinal or choroidal damage
 - i. commotio retinae
 5. diagnostic imaging

- a. X-Rays
 - i. Caldwell view
 - ii. Lateral view
 - iii. Waters view
 - b. CT scan of the orbits
 - i. axial and coronal views
- D. Management
 - 1. nasal decongestants
 - 2. broad spectrum oral antibiotic
 - 3. ice pack to orbit 24-48 hours
 - 4. no nose blowing
 - 5. manage other ocular sequelae
 - 6. referral for surgical repair
 - 7. gonioscopy 1 month later

XI. Chemical Burns

1. Take a thorough history on the causative agent. Poison Control Center can be called if necessary or can review MSDS of compound online. Severity is dependent on the chemical.
 - a. Acid burns are usually self-limiting (e.g. battery acid, industrial cleaners)
 - b. Alkali burns can penetrate ocular tissue (ex. Lye, cement, ammonia)
2. Initial treatment is copious irrigation with saline solution. **DO NOT CHECK VA FIRST!**
3. Irrigate 30 minutes using 1 liter per eye per 30 minutes
4. 5 minutes after ceasing irrigation, use litmus paper to test pH
5. Stop irrigating when pH is neutral (7)
6. Examine cornea and conjunctiva with sodium fluorescein for residual solid material
7. Evert eyelids to rule out any foreign body or particulate matter
8. Check IOP. Elevated IOP is treated with a topical glaucoma medication or acetazolamide 250 mg qid.
9. Apply a broad spectrum antibiotic ointment to the lids q6h and solution to the eye q6h.
10. Anterior uveitis can be treated with a cycloplegic agent. Avoid phenylephrine due to the vasoconstrictive properties.
11. Topical steroid to reduce inflammation
12. Frequent use (q1h) of PF artificial tear
13. Prescribe oral analgesic for pain. Also consider using topical NSAID.
14. Amniotic membrane may be of benefit

15. Doxycycline for anti-inflammatory benefits and high-dose Vitamin C to help with corneal healing
16. Off-label compounded losartan has shown benefit in animal studies
17. If burns are severe, consult with an oculoplastic surgeon and/or corneal specialist
18. Monitor for long-term complications (may need to go on to need limbal stem cell transplant, eyelid reconstruction, tarsorrhaphy, corneal transplant, K-pro)