



Editor-in-Chief: Mel Herbert, MD
 Executive Editor: Stuart Swadron, MD
 Associate Editor: Jessica Mason, MD

C3: The Painful Red Eye

Jessica Mason MD, Stuart Swadron MD, Mel Herbert MD

* *Drug doses are a guide only, always check a second source and follow local practice guidelines*

Take Home Points:

- Acute angle closure glaucoma requires immediate specialist consultation and intervention to lower intraocular pressure.
- Orbital cellulitis requires broad spectrum antibiotics, advanced imaging, emergent consultation and admission.
- Acute iritis and keratitis can both result in serious complications in a short timeframe; specialist consultation is indicated.
- Most conjunctivitis is benign, but when pain, redness, edema and discharge are severe or worsening consider corneal and/or herpetic involvement.

Introduction

This is the first of a three part C3 series on the eye. Although there is tremendous overlap in the concepts involved, we will consider the patient with an eye complaint in the same ways that they present to the ED:

- Painful red eye
- Eye trauma
- Acute vision loss

In this episode of C3, we examine the approach to the patient with a painful red eye(s). The causes of a painful red eye range from benign and self-limited to very serious and sight threatening. We will emphasize a methodical approach and discuss the skills and procedures that we need to be familiar with in the acute care setting.

Key Considerations On History

- Eye trauma and foreign bodies may be occult!
 - A patient may not realize that something fell into their eye or that they accidentally scratched their eye during sleep or while intoxicated.
- Patients with a red painful eye(s) typically have ocular pathology but occasionally this complaint represents pathology *beyond* the eye.
- Examples include:
 - Soft tissue infections around the eye, such as orbital cellulitis
 - Headaches, especially cluster headaches, may present with eye redness and pain, usually unilateral



- Conversely, some patients with a painful red eye may present with a different chief complaint
 - The classic example is acute angle closure glaucoma (AACG), which may present as a sudden onset headache
- The presence or use of **contact lenses** and a history of **eye surgery** are two critical pieces of information that will affect management.
- The description of the pain
 - **Itching, burning or sharp pain** as well as a **sensation of a foreign body** tend to localize the pathology to the superficial structures of the eye.
 - This includes the lids, lashes, lacrimal structures, conjunctiva and cornea.
 - Topical anesthetics, such as proparacaine drops, may relieve this pain dramatically, especially in the case of corneal pathology (foreign body, abrasion, ulcer or keratitis)
 - **Deep boring pain and sudden onset of pain** is suggestive of a more serious cause such as AACG or vascular ischemia (e.g. temporal arteritis)

Physical Examination

- A systematic eye examination is key to identify the sight-threatening pathologies
- One approach is to move from outside the globe inward:
 - Periorbital structures
 - Eyelids, lashes, lids
 - Lacrimal structures
 - Conjunctiva and sclera
 - Cornea
 - Anterior chamber
 - Lens
 - Vitreous
 - Retina
- Visual acuity is key and should be obtained early
 - Acuity should be performed with refractive lenses or glasses
 - Our concern is with more serious causes of decreased acuity such as retinal or vitreous pathology
 - Having the patient look through a pinhole will improve their acuity if it is due to refractive error (e.g. if they don't have their glasses)
- Visual fields testing by confrontation
- Extraocular movements (EOM)
 - Ask the patient if they see double when testing EOM to detect any subtle diplopia



- Pupillary shape, size and reaction to light
- Fundoscopic examination
- Intraocular pressure (IOP)
 - This is now easily measured with an instrument in the ED
- Slit lamp examination
 - Not always available but of enormous help in diagnosis and treatment of a wide variety of circumstances
- Ocular ultrasound (US) is emerging adjunct to the bedside physical examination

COMMON DIAGNOSES AND TREATMENTS

Extraorbital Structures

- Blepharitis
 - **Inflammation at the eyelash follicles**
 - Usually Staph epidermidis, can also occur with seborrheic dermatitis, atopic dermatitis, and rarely can be lice
 - When it's staph it's usually crusty at the base of the eyelashes, when it's seborrhea it's greasy
 - Treatment
 - Gentle cleaning with warm wash cloth and mild shampoo twice per day, but if severe may need antibiotic drops or ointment, artificial tear drops for comfort if dry eyes
- Dacryocystitis
 - **Tearing and swelling of the medial edge of the lower lid** where the tears drain
 - Can mimic periorbital cellulitis and orbital cellulitis
 - Treatment
 - Oral antibiotics if well appearing, cover for skin and nasal flora
- Hordeolum (stye)
 - **A pustule at the lash line** - it's basically an eyelid pimple
 - Can be internal or external
 - Treatment
 - If simple - warm compresses and erythromycin ointment (usually staph)
 - If concern for more severe or extension of infection, may need oral antibiotics
- Chalazion
 - Blocked Zeis gland (an oil gland at the tarsal plate)
 - More chronic and recurrent than hordeolum
 - Treatment
 - Can be referred to ophtho for either excision or steroid injections



Conjunctiva And Sclera

- Viral Conjunctivitis
 - Superficial pain (may report foreign body sensation) or even painless
 - Watery discharge typically
 - Typically bilateral but may start or be more severe in one eye
 - Generally benign and self limited
 - Treatment
 - Cool compresses, artificial tears for comfort
 - Set expectations that this can last a couple of weeks
 - Emphasize importance of hand hygiene
- Allergic Conjunctivitis
 - Typically bilateral
 - Treat with antihistamine drops, systemic antihistamines
- Bacterial Conjunctivitis
 - Clues to bacterial infection include:
 - Purulent discharge
 - Chemosis (swelling of conjunctiva)
 - Usually no preauricular lymphadenopathy (in contrast to viral), except for chlamydia trachoma (which often does have a preauricular node)
 - Treatment
 - To cover staph and strep - trimethoprim/polymyxin B drops
 - This combination is good because it avoids both sulfa and neomycin (many patients have allergies to these)
 - Gonococcal infections typically have copious purulent discharge and can be sight threatening
 - Culture and consultation are appropriate
- Complications and cautions
 - The vast majority of conjunctivitis cases are mild and resolve gradually over the course of days
 - **When pain redness, edema and discharge are severe or worsening consider corneal and/or herpetic involvement**
 - **Use fluorescein stain and a slit lamp if available to look for corneal abrasions, ulcers or a herpetic (dendritic) staining pattern**
 - Specialist consultation is appropriate if corneal ulcers or herpetic involvement is suspected
- Pinguecula and Pterygium
 - Raised fibrous yellow looking masses on the conjunctiva, usually medial side
 - **Pterygium** crosses into the cornea



- **Pinguecula** does not cross the cornea
 - Can be irritating, cause foreign body sensation
 - Both are caused by UV exposure, dusty air
 - Treat with artificial tears, NSAID drops, ophtho follow up (may be excised)
- Scleritis
 - Moderate to severe pain, tender to palpation
 - Associated with a variety of conditions
 - Underlying sclera is pink
 - Oral NSAIDs
 - Urgent ophtho referral
- Subconjunctival hemorrhage
 - Usually a painless collection of blood right behind the cornea
 - Some patients have a foreign body sensation
 - If painful think about trauma and globe injury
 - Initially bright red, then changes colors with time as blood breaks down
 - Can be alarming to patient
 - Generally benign and self-limited
 - Avoid contact sports, unnecessary antiplatelet agents

Cornea And Anterior Chamber

- Cornea
 - Keratitis is inflammation of the cornea
 - It can be sight threatening if its cause is not identified and treated
 - Causes **severe pain, photophobia, irritation, tearing**
- Causes include:
 - UV light - snow blindness, welder's blindness
 - Punctate keratitis seen with fluorescein staining
 - Herpesviruses (HSV and VZV)
 - Starts as punctate keratitis, then dendritic, then coalesces to geographic ulcerations
 - Iritis present with cell/flare on slit lamp examination in about half of cases
 - Treatment
 - Oral antivirals (acyclovir), add topical for HSV



- If there are ulcers, add antibacterials
 - Chemical keratitis
 - Ischemic keratitis from contact lenses
- Iritis
 - **Iritis is inflammation of the iris**
 - Anterior uveitis is inflammation of the iris and ciliary body and is also called iridocyclitis
 - Causes include trauma, infection, and autoimmune diseases (e.g., juvenile rheumatoid arthritis, sarcoidosis, reactive arthritis)
 - Often unilateral
 - Key examination findings
 - Photophobia or pain with both direct and consensual light exposure (e.g. pain in the affected eye when light is applied to the other eye)
 - Acuity is usually moderately decreased
 - Redness is from the enlarged deep arteries of the globe, not the superficial conjunctival vessels
 - A cotton applicator can be used to differentiate the two by gently moving the conjunctiva (its vessels move with it)
 - Limbic flush - an intense erythema in the limbus (the margin of the iris and sclera)
 - Cell and flare on the slit lamp exam
 - Cell - White blood cells floating in the anterior chamber, like headlights on snowflakes
 - Flare - you see the beam, like movie projector, signs of small protein deposits which also occurs with iritis
 - Treatment
 - Prednisolone drops - every 2 hrs, then tapered (in consultation with ophthalmologist)
 - Cycloplegics (e.g., homatropine) to prevent ciliary muscle spasm
 - Specialist follow-up
- Hyphema
 - **Hyphema is blood in the anterior chamber**
 - Can appear as a reddish tinge or in an upright patient as a blood level
 - Can be spontaneous or traumatic
 - May be asymptomatic but larger ones are usually painful and impair vision
 - The diagnosis is more serious in patients with sickle cell
 - Treatment
 - Specialist consultation
 - Most guidelines recommend admission for hyphemas of >50%
 - The so-called “Eight ball hyphema” is when 100% of the anterior chamber is full of blood



- These patients are at risk for glaucoma
 - Avoid NSAIDs for pain
 - Elevation of head of bed 45 degrees
- Endophthalmitis
 - **Infection of the aqueous and vitreous humor**
 - Usually follows eye surgery or penetrating eye trauma
 - Poor prognosis
 - Severe pain out of proportion, redness, decreased vision, discharge, lid swelling, diminished red reflex (on funduscopy)
 - Cell and flare visible on slit lamp examination
 - When advanced, patients may have a **hypopyon** (pus settling out in anterior chamber, much like a hyphema)
 - Emergent ophthalmology consult

Acute Angle Closure Glaucoma (AACG)

- Key History
 - Painful red eye, headache, blurry vision
 - Onset may be rapid and may start in a dimly lit room
 - The contraction of the iris to the dilate the eye precipitates AACG
 - Nausea and vomiting
- Key Examination
 - Elevated intraocular pressure (IOP) >30 mmHg
 - Abnormal is over 20, but most use 30 for AACG
 - Limbic flush
 - Cornea may be edematous (cloudy)
 - Pupil mid-dilated and frozen
- Treatment
 - Emergent ophthalmology consult
 - 30 degree head up
 - Topical treatments (drops)
 - Beta blockers (decrease aqueous production)
 - Timolol, give a drop, then repeat in 5 mins
 - Carbonic anhydrase inhibitor (decrease aqueous production)
 - e.g., dorzolamide



- Alpha-2 agonist (constricts pupil)
 - e.g., brimonidine or apraclonidine
- Cholinergics (constricts pupil)
 - e.g. pilocarpine
 - Can only be used after pupil is “unstuck” by initial treatments
- Systemic treatments
 - IV Antiemetics
 - PO acetazolamide
 - Osmotic agents (decrease IOP)
 - PO glycerol, IV mannitol

Periorbital And Orbital Cellulitis

- **Soft tissue infection of the structures around the globe**
- Preseptal (periorbital) cellulitis is common and less severe
 - Infection is anterior to the orbital rim - the connective tissue between the orbit and the tarsal plate of the eyelid
 - Usually from URI, sinus infections, eyelid infections (hordeolum, chalazion, trauma)
 - Staph and strep
 - **Key exam finding: No pain with EOM**
 - Treatment:
 - Oral antibiotics
 - Can be treated as an outpatient
- Orbital cellulitis
 - Deeper infection
 - **Key exam finding: Proptosis or pain with EOM**
 - May also have binocular diplopia, papilledema, chemosis
 - Management
 - Broad spectrum antibiotics
 - CT Head, Orbits
 - Check the IOP, especially if proptosis
 - If > 20 mm Hg, may need surgical decompression
 - Admit with ophthalmology consultation
 - [EMA August 2010 Abstract 16: Acute Periorbital Infections: Who Needs Emergent Imaging?](#)



Disposition

- Patients with eye emergencies may be dispositioned per ophthalmology - this may be to a hospital or office setting if the patient is otherwise stable
- Patients with eye urgencies may be seen by ophthalmology within a short period of time established at the time of initial presentation - typically 24-48 hours
- Most patients with conjunctivitis and other superficial infections do not need specialist consultation

Common Pitfalls

- Common pitfalls
 - Not getting a visual acuity early in the assessment
 - The visual acuity is a vital sign for a patient with an eye complaint
 - Accurate visual acuity should be obtained by a provider
 - Jumping straight to the eyeball and missing other pathology
 - A review of systems should help identify extra-ocular conditions
 - A thorough eye examination should be performed and documented every time
 - Using corticosteroids without specialist involvement
 - Corticosteroid drops can precipitate or accelerate dangerous viral infections, especially herpesviruses

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