411- Be confident in what you SEE don’t feel like you are treating in EYE-solation

Erin Stockman RN, BSN, PNP-PC

Speaker introduction

- Erin Stockman is a pediatric nurse practitioner working with the inpatient consult and urgent care service at the Ophthalmology Foundation at Children’s Hospital Boston. They strive to encourage continuity and communication between surgical and bedside teams to ensure best patient experiences and outcomes.

Disclosures

- My employer covered the cost of attending this conference (CHOF at Boston Children’s Hospital)

Learning Objectives

- Identify acute conditions that should be escalated to a surgical ophthalmology team.
- Distinguish orbital cellulitis from preseptal cellulitis, insect bites, conjunctivitis, dacryocystitis, dacrocystocele and cellulitis of the skin.
- Recognize evidence-based imaging techniques modalities.
- Describe treatment plans for the above conditions.

My Role in Ophthalmology

Phone triage
Urgent clinic
Inpatient consults

ORBITAL CELLULITIS

Infection posterior the orbital septum (anterior of the septum = preseptal cellulitis). Often resulting in abscess, most commonly located medially in the orbit (near the ethmoid sinus).

Sources:
90% caused by secondary infection from adjacent sinusitis (especially the ethmoid sinus). Other etiologies (the remaining 10%) are from trauma, surgery, or systemic bacteremia + most often opptic-thrombophlebitis from veins draining the sinuses.

Staphylococcus aureus (+), Streptococcus (+), Hemophilus influenzae (−) less likely if vaccinated, Moraxella catarrhalis, Other anaerobes
SYMPTOMS
- Leukocytosis on CBC
- Proptosis
- Pain with EOMs
- Decreased EOMs
- Decreased color & visual acuity
- Pupillary abnormalities
- Resistance to retropulsion

PEARLS: Often correlates with sinus disease. Consider getting a CBC. Treat referred facial pain with oral ibuprofen. Exam often has restrictions in EOMs with pain. Check for optic neuropathy due to infection/compression (decreased visual acuity, decreased color vision, pupillary defect)

Imaging
Computed tomography (aka a CT scan) of brain the brain and orbits (with both axial and coronal views) with and without intravenous (IV) contrast.
- CT can often be performed quickly and without sedation
- MRI should also be performed if concerned for CNS involvement

TREATMENT
- Involve Ophthalmology, ORL/ENT, and Infectious Disease
- Antibiotics- broad spectrum to cover gram-positive, gram-negative, and anaerobic organisms
  - Duration of treatment depends on symptoms
  - Needs careful monitoring when bridging to oral antibiotics, needs 24-48hour follow up post discharge to ensure no regression in symptoms

CONSIDER: CNS penetrating/blood-brain barrier crossing antibiotics- if concern for intracranial extension
- Staphylococcus aureus (+)
- Streptococcus (+)
- Moraxella catarrhalis (+)
- Haemophilus influenzae
- Other anaerobes

Most common organisms:
- Penicillin
- Ceftriaxone (gram -)
- Vancomycin (MRSA and gram +)
- Metronidazole (anaerobes)

Intravenous (IV)
- Clindamycin (+)
- Ceftriaxone (+/-)
- Gentamicin (+)
- Aminoglycoside (+/-)
- Vancomycin (MRSA & +)
- Metronidazole (anaerobes)

ORAL (PO)
- Clindamycin (+)
- Doxycycline (+/-)
- Amoxicillin-clavulanate (+/-)

IV antibiotics for 48-72hr and then transition to oral
- Tailor treatment if culture and sensitivities are available, otherwise start broad spectrum

Preseptal (aka Periorbital) Cellulitis
Confined to the eyelids and periorbital structures anterior to the orbital septum

SOURCES:
- Trauma
- Insect/other bites
- Chalazion/stye
- Nasolacrimal duct obstruction (NLDO) evolving into a dacryocystitis
- Infected lacrimal gland (dacroyoadenitis)

SYMPTOMS:
- Elevated CBC
- Fever
- Warmth/spreading redness
- Eyelid erythema
- No proptosis
- No restrictions in eye movements

Preseptal exams every 12 hours until WBC trends down, defervescence, and ocular symptoms have improved

Clinical improvement?

<24hr of IV antibiotics

Surgical I&D (orrr & ER/04)

 Continue IV antibiotics

YES

NO

Bridge to oral antibiotics for 1+ week

YES

NO

Continue to monitor until IV antibiotics for 48-72hrs
Treatment: Broad-spectrum oral antibiotics (target gram-positive bacteria and *H. influenzae*)

**Outpatient:**
- Amoxicillin-clavulanate
- Trimethoprim/sulfamethoxazole (if PCN allergic)
- Nasal decongestants

**Inpatient:** failed therapy or toxic appearing. Switch to oral if improved after 24-48hrs. Add or switch antibiotics and consider CT and LP if no improvement in the same time frame. IV:
- Ampicillin/subactam (preferred)
- Clindamycin
- Ceftiraxone
- Cefotaxime
- Trimethoprim/sulfamethoxazole or Vacomycin (MRSA)

**PEARLS**
- Consider doing a CBC. No eye redness, no pain or restrictions in EOMs, no proptosis with preseptal cellulitis. Consider meds that cross the blood brain barrier if concerned about a suppurative infection. Follow up outpatient within 48 hours of bridging to oral antibiotics to ensure continued improvement.

**CASE:** 16 year old girl, referred by the ED, significant periorbital edema but minimal erythema. Normal vision, colors are full, pupils are normal, nerves are healthy on dilated exam, EOMs are full.

**FINDINGS** on CT (Ophthalmology did not suggest imaging):
- There is mild preseptal right periorbital swelling. There is slight asymmetric enlargement of the right lacrimal gland. The paranasal sinuses are normal in caliber and symmetry. There is no evidence of the superior ophthalmic veins.
- There is minimal preseptal thickening in the superior orbit. The extracanal muscles are normal in caliber and symmetry. There is no evidence of the orbital apex.
- There is mild soft tissue thickening in the right preseptal region. The nasal septum is normal.
- Visualized intracranial structures are grossly normal.

**IMPRESSION:**
- Mild right preseptal periorbital cellulitis and asymmetric thickening of the right lacrimal gland.

**Nasolacrimal Duct Obstruction (NLDO)**

**SYMPTOMS**
- Tearing
- Eyelid swelling
- Reflux of discharge from punctum with pressure

**TREATMENT**
- Probe (can be performed in office during neonatal period)
- Generally recommend wait until >1 year of age
- Or if parents want us to
- Low success rate (only 80% success rate)
- Crieller massage (digital pressure towards the nose 4 times a day, or at each feed)

**Dacryocystitis**
- This is an infectious process, resulting from a nasolacrimal duct obstruction or infected lacrimal gland which has involved into a preseptal cellulitis in infants. Defined by a fluctuant abcess near the medial canthus. It can occur in adults but is uncommon.

**Dacryocystocele** (aka amniotocele, lacrimal sac mucocele)

**SYMPTOMS**
- Blush mass inferior to the medial canthus
- Often present at birth
- Preseptal cellulitis symptoms in an newborn

**TREATMENT**
- Antibiotics if any symptoms of infection (preseptal cellulitis)
- Controversial-refer to ophthalmology, some prefer to operate.
Conjunctivitis (nonspecific term for irritation of the conjunctiva causing red eye)

Focusing on the infectious non-febrile etiologies

- Bacterial
- Viral

PEARLS: No severe pain, photophobia, or acute vision changes. May have palpable preauricular lymph nodes if a true infectious process. In severe conjunctivitis can have bleeding = hemorrhagic conjunctivitis due to severe irritation (supportive care only)

BACTERIAL Conjunctivitis

Staphylococcus epidermidis, Streptococcus pneumoniae, Haemophilus influenzae, Neisseria gonorrhoeae, Chlamydia trachomatis

TREATMENT:
- Redness
- Purulent white-yellow discharge

VIRAL Conjunctivitis

Adenoviruses, enteroviruses, herpes simplex virus (HSV), herpes-varicella zoster virus (VZV), measles, Mononucleosis (EBV)

TREATMENT:
- Redness
- Watery/light colored discharge

PEARLS: Adenovirus is the most common lasting 4-7 days but can last up to 2-3 weeks
CASE: 8 year old boy with eye redness and discharge from the eye was prescribed ophthalmic antibiotics by a colleague last week. Patient went to a urgent care center over the weekend and given oral antibiotics for a faint rash and swelling around the eye lids concerning for preseptal cellulitis. Mom emails you a photo today, reporting a crusting rash.

**HOREDEOLUM (Stye) & CHALAZION**

**SYMPTOMS**
- Visible or palpable subcutaneous nodule in the eyelid
- Preauricular palpable lymph node
- History of previous infection
- History of trauma
- Pain
- Photophobia
- Red eye
- Discharge/tearing
- Mucous strands on ocular surface
- Staining with fluorescein on mucous membranes and ocular surface
- Breakdown of mucous membranes of lid (preauricular palpable lymph node)

**TREATMENT** (for both)
- Warm compresses (20-seconds several times per day)
- Gently massage towards the lid margin
- Lid scrubs with tear-free shampoo,
- Gentle massage towards the lid margin
- Warm compresses (30+ seconds several times per day)
- Topical ophthalmic antibiotics and steroids
- Oral acetaminophen (1-2 tab 30 minutes before)
- Refer trauma to ophthalmology

**PEARLS:** Rule out preseptal cellulitis. Surgery is only offered when no longer inflamed, surgery is indicated when area is irritated causes scarring. Drainage is a good sign, this means it is resolving and no intervention is necessary. Topical ophthalmic antibiotics and steroids do not penetrate the tissue of the lid.

**DRY EYE → EXPOSURE KERATOPATHY → CORNEAL ULCER**

**SYMPTOMS** (in the setting of incomplete eye closure)
- Eye redness
- Discharge/tearing
- Burning
- Watering
- Foreign body sensation
- Photophobia
- Red eye
- Discharge/tearing
- Mucous strands on ocular surface
- Staining with fluorescein on mucous membranes and ocular surface

**CAUSES:**
- Neurotropic virus (HSV, VZV, CMV)
- Eye irritation
- Foreign body (in the eye)
- Corneal abrasion/trauma
- Keratitis (a condition of the cornea)
- Keratoconjunctivitis (an inflammation of the cornea)
- Sjögren’s syndrome
- Dry eye syndrome

**TREATMENT**
- Oral prednisone (40-60 mg/day)
- Oral acetaminophen (1-2 tab 30 minutes before)
- Topical ophthalmic steroids, cyclosporine
- Topical lubricants
- Punctal plugs
- Moicrft bandages
- Surgery (tarsorrhaphy)

**PEARLS:** Always refer suspected HSV conjunctivitis to ophthalmology. Punctal plugs, bandages, and surgery do not treat the problem. Do not give steroids if suspected.

**HSV CONJUNCTIVITIS**

**Herpes Simple Virus** (HSV), **Varicella-Zoster Virus** (VZV)

**SYMPTOMS**
- Red eye
- Photophobia
- History of previous infection
- History of trauma
- Contact lens user
- Non-contact lens user (all treatment four times per day):
- Ointment (preferred): four times per day:
- Polymyxin/trimethoprim four times per day
- Fingernail or vegetable matter as cause of trauma:
- Fluoroquinolones (gatifloxacin)
- Ocular propracaine ophthalmic drops:
- Dexamethasone + propracaine four times per day
- Treatment of HSV ocular involvement:
- Oral acyclovir (7-14 days)
- Ganciclovir 0.15% (7-14 days)
- Oral prednisone (40-60 mg/day)
- Discontinue steroids

**PEARLS:** If not significantly improved in 24-48 hours refer to ophthalmology and we will follow every 3-5 days until resolved.

**CORNEAL ABRASION/TRAUMA**

**SYMPTOMS**
- Pain
- Photophobia
- History of trauma
- Contact lens user
- Non-contact lens user (all treatment four times per day):
- Ointment (preferred): four times per day:
- Polymyxin/trimethoprim four times per day
- Non-contact lens user (all treatment four times per day):
- Oral prednisone (40-60 mg/day)
- Oral acetaminophen (1-2 tab 30 minutes before)
- Topical ophthalmic antibiotics

**TREATMENT** (Corneal abrasion)
- Contact lens user (all treatment four times per day):
- Ointment (preferred): four times per day:
- Polymyxin/trimethoprim four times per day
- Non-contact lens user (all treatment four times per day):
- Oral prednisone (40-60 mg/day)
- Oral acetaminophen (1-2 tab 30 minutes before)
- Topical ophthalmic antibiotics

**PEARLS:** Most commonly seen in contact lens users. Most completely heal within 24-48 hours, the most common cause of any type of “eye pain” is due to a corneal surface issue.

**SJS/Mucositis/MIRM/TENS/Erythema Multiform**

**SYMPTOMS**
- Breakdown of mucous membranes of lid margin and bulbar conjunctiva (unilateral or bilateral)
- Mucous strands on ocular surface

**TREATMENT**
- Amniotic membrane transplant
- Bandage (clear non refractive error corrective) lenses
- Frequent lubrication
- Steroids
- Antibiotics to ocular surface

**PEARLS:** If not treated dry eye leads to exposure keratopathy (breakdown of the corneal surface), which can be an infection = corneal ulcer. Ulcers take months to heal. Ulcers should be cultured for sensitivity. Keratopathy and ulcers will stain with fluorescein (similar to corneal abrasion).
Which of the following would not benefit from prophylactic antibiotics?
A. Corneal abrasion
B. Exposure keratopathy
C. Subconjunctival hemorrhage

Steroids cause all of the following side effects except:
A. Exacerbate HSV infection
B. Inhibit ocular epithelium healing
C. Increase intraocular pressure
D. Treat conjunctivitis

Which of the following cause damage to the surface of the eye and should be treated with prophylactic antibiotics:
A. SJS/Mucositis/MIRM/TENS/Erythema Multiform
B. Exposure keratopathy
C. Trauma
D. HSV
E. All of the above

A 15 year old child present with eye pain, based on this fluorescein exam it would be reasonable to:
A. Send patient to the local ED
B. Urgent referral for same-day ophthalmology visit
C. Give topical steroids for pain management
D. Page/call ophthalmology to discuss follow up/treatment

You learn after speaking with ophthalmology you learn that the mechanism of injury was the child’s sibling poking them with a wooden stick? Which is the best treatment?
A. Erythromycin ointment
B. Bacitracin ointment
C. Moxifloxacin drops
D. Topical steroid

A 2 week old infant with a 6x6mm bluish fluctuant area near the right tear duct. Parents report they have been massaging the area per the instructions of the nursery, however for the past two days there has been no discharge coming from the eye or nose and the area looks more red. The best course of action is:
A. Refer to ED for CT scan to rule out cellulitis
B. Began antibiotics
C. Refer to ophthalmology
D. Press firmly on the area towards the nose to decompress
A 2yo presents with fussiness and erythema and edema of the right orbit in your ED. She is extremely difficult to examine. A WBC count is elevated, concerning for an infectious process. You order a fast CT scan.

Your diagnosis is:
A. Sinus infection
B. Orbital cellulitis
C. Preseptal cellulitis
D. Conjunctivitis

CT result:
“There is induration and edema of the right periorbital soft tissues extending posteriorly to the medial extraconal fat. Furthermore, the right ethmoid aircells are opacified. There are signs of acute myositis of the right medial rectus muscle. There is no abscess present.

There is no obvious intracranial pathology within the field-of-view.”

CITATIONS

THANK YOU!