

ED Ophthalmology

I. Hx and PE

- PQRST of visual complain, events surrounding complaint, possible projectile involvement.

	OD (right)	OS (left)
Acuity (+/- pinhole)		
EOM's (SO(CNVI), LR(CNIV), CNIII all other)		
Lids, lashes, lacrimoles		
Pupils		
Conjunctiva/sclera		
Cornea (fluorescence)		
Swinging light (APD)		
Anter chamber (cells, flare, hyphema, hypopion)		
Fundus		

- **The Fundoscopic exam:**
- Optic Disc: a blind spot without photo receptors (medial to the optic N.)
- The Macula: a darkened area temporal to the optic N. for central vision.
- The Fovea: located within the macula (highest acuity).

II. The Red Eye:

1. Hordeolum (stye) – infection of oil gland at lid margin.
 - **Chalazion** – infection of meibomian gland.
 - Tx: warm compresses +/- erythromycin ointment or other abx as indicated. +/- discussion and f/u with ophthalmology as indicated.
2. Blepharitis: staph infxn of eyelid; greasy, scaly, itchy. Tx with dandruff shampoo.
3. Pinguecula: cream/white raised growth of conjunctiva; **Pterygium**: excess conjunctival growth of fibrous tissue over conjunctiva/cornea. Typically these will not be addressed by an ophthalmologist until they impinge on the visual field.
4. Dacryocystitis – lacrimal duct impaction with infection (medial canthus).
 - Tx: warm compresses + Abx (Augmentin). R/O orbital cellulitis (IV Abx + Admit).
5. Conjunctivitis: inflamm. of mucous membrane.
 - Bacterial: Injected conjunctiva, thin/watery discharge and edema of eyelids. Copious purulent discharge with GC (can quickly ulcerate cornea).
 - If bacterial, usually staph or strep, (consider **pseudomonas if contact lens**, consider **CG in neonates**). Tx: abx drops or erythromycin ointment.
 - Viral usually adeno / HSV – usually with fever, pharyngitis, conjunctivitis. Tx is conservative unless suspect bacterial superinfection. Good handwashing at home.
 - Herpes Zoster Ophthalmicus: a form of shingles with trigeminal distribution: vesicles on nose tip “Hutchinson sign” and dendritic epithelia defect; Tx with oral acyclovir, erythromycin topical and ophtho consultation.
 - Acute atopic conjunctivitis – itchy, burning eyes hyperemic and swollen; Tx with cold compress and antihistamines (Naphcon A) short duration!
6. Bacterial Keratitis: rapidly progressing dz; corneal ulceration and edema.
 - Clin presents with injected conjunctiva, pain, fb sensation, discharge, photophobia, cells in AC (+/- hypopyon). Usually infectious and post abrasion; (staph, HSV, sjogrens, chemicals).
 - Tx: BS abx & immediate consult.
7. Uveitis: (inflammation of iris, ciliary body, choroids); if only involves iris and ciliary body – called **iritis**.
 - Caused by post-traumatic, autoimmune, idiopathic.
 - Clin: pain, photophobia, conjunctival injection; usually unilateral. Perilimbal injection, miotic pupil (due to ciliary spasm), consensual photophobia, AC cells/flare.
 - Tx: cycloplegics +/- topical steroids (rec in conjunction with ophtho).

8. Glaucoma: open angle is gradual vision loss without other symptoms.
 - Acute angle closure glaucoma is the emergency; attacks often precipitated by entering a dimly-lit room; the pupil dilates and obstructs Schlemm's canal.
 - Clin: sudden onset pain, blurred vision, lacrimation, n/v, c/o seeing halos around lights; decr visual acuity, conjunctival injection, fixed mid pupil, hazy cornea.
 - Tx: Urgent ophtho consult with the following meds:
 - *Timolol* (beta-agonist) – (timoptic 0.5% q 30-60 min)
 - *Acetazolamide* (CA inhibitor) - **Contraindicated in Sicklers** -500 mg (IV/IV then 250mg q6 hours-hold for sulfa allergy)
 - *Mannitol* 1-2mg/kg IV;
 - *Pilocarpine* (mitotics) - facilitates drainage; 2% sol one drop q 15 min for 2 hrs)
 - Definitive tx is iridotomy with ophtho.
9. Periorbital (preseptal) Cellulitis:
 - Clinically presents as swollen, erythematous eyelids with mild conjunctival injection; normal visual acuity, full ROM (no pain), no proptosis.
 - Tx with empiric *Augmentin* to cover skin/sinus pathogens and close f/u.
 - Admission indications include failed outpt tx, intractable vomiting, toxic appearance, questionable f/u or compliance concerns, or inability to r/o orbital cellulitis.
10. Orbital (septal) Cellulitis:
 - Clinically presents with cellulitic extension beyond the orbital septum and causes diminished visual acuity, proptosis, painful or reduced EOM (also has edema/erythema of eyelids).
 - W/u should include CT of orbits and sinuses to eval for abscess.
 - Tx: admit for IV abx and Ophtho consult. Bacteria in sinus dz are usual suspects for this condition (staph, strep, H flu). In DM and immunocompromised consider fungal (mucormycoses).

III. Vision Loss / Diplopia: General Statements

1. In acute episodes, always consider the cannot-miss diagnoses: ruptured globe, detached retina, acute angle glaucoma, & CRAO/CRVO.
2. Monocular vision loss is generally due to problem with: globe, retina, or optic N.
3. Homonymous Hemianopsia is generally a lesion behind the optic tract (posterior circulation or CVA).
4. Bitemporal Hemianopsia is generally a lesion in the optic chiasm (aneurysm, pituitary tumor).
5. Monocular Diplopia is very unusual (consider lens dislocation, macular holes, partial retinal detachment).
6. Binocular Diplopia: disappears when one eye is covered.
 - Consider CN palsey (EOM defect), entrapment, internuclear ophthalmoplegia of the MLF – controls conjugate eye mov't; eyes move well separately but not together.
 - Consider systemic disease (DM, Vascular, MS).

IV. Painless Vision Loss

1. Vitreous Hemorrhage: usually secondary to retinal tears or vascular bleed in retina. Hx usually includes recent development of floaters/cobwebs.
 - Exam may show proliferative retinopathy and/or hemorrhage. "Terson's syndrome" is SAH with associated vitreous bleeding.
 - Tx: watchful waiting with close ophtho follow-up. Emergent follow-up if suspect traumatic cause with possible retinal detachment or globe rupture.
2. Retinal Detachment: presents as new onset floaters/flashes, or curtain coming across visual field and vision loss or visual field deficit.
 - Tx is urgent ophtho consultation. Ultrasound can aid in diagnosis.
3. Central Retinal Artery Occlusion (CRAO): severe sudden onset of decreased vision (acuity) – usually only light perception or finger counting.
 - Often secondary to cholesterol emboli ("Hollenjorst plaques") thrombosis, TA, sickle, trauma.
 - Exam: bright spots on fundoscopic exam, retina becomes pale and yellow from ischemia and fovea becomes reddened (relatively) – the "cherry red spot." Also may have APD.
 - Tx: emergent ophtho consult; ocular massage (to dislodge clot), topical beta-blockers, mannitol,

- acetazolamide; anterior chamber paracentesis (ophtho).
4. Central Retinal Vein Occlusion (CRVO): The ischemic form presents with severe vision loss with retinal hemorrhages, exudates, and afferent papillary defect (secondary to thrombotic occlusion of CRV with backup and engorgement of retinal veins, blurred disc margins).
 - “**Blood and thunder**” fundoscopic exam.
 - Tx: aspirin and immediate ophtho consultation

V. Painful Vision Loss

1. Acute Angle Glaucoma: Presents with eye pain, headache, cloudy pupil / mid-fixed, increased IOP. Can be precipitated by darkness (movie). See description above.
2. Optic Neuritis: Presents with reduced vision, pain with EOM's, visual field cuts, APD (most commonly in young females). Consult ophtho; +/- IV steroids.
3. Vitreous Hemorrhage (8 ball) – see description above.
4. Papillitis: painful, unilateral central vision loss.
 - Treatment is directed toward the underlying cause.
 - Systemic corticosteroids may be helpful, but the tendency without treatment is toward improvement. Visual acuity usually begins to improve in 2-3 weeks, and sometimes returns to normal in a few days.
 - Close referral for reevaluation and further w/u with ophtho.

VI. Trauma

1. Facial Fractures
 - Blowout fracture: usually inferior/medial wall of orbit.
 - PE: inferior rectus entrapment (diplopia on upward gaze), paresthesia of infraorbital nerve, subcutaneous emphysema. Rule-out entrapment.
 - Dx with CT (Water's view on s-ray). Refer/consult ophtho.
2. Eyelid Lacs: Refer lacs involving lid margins > 1mm, medial to canthus, or with fat protruding (tarsal plate involvement).
3. Subconjunctival Hemorrhage: typically self-limited; rule-out zygomatic fx and globe rupture.
4. Corneal Abrasion: Sx: pain, FB sensation, red eye, tearing, photophobia.
 - Topical anesthesia will give relief (Tetracaine).
 - Tx with abx drops/ointment, update Td, pain meds;
 - Fluorescence patterns: central circular – contact lens (cover for pseudomonas), vertical linear – FB under eyelid, multiple punctate – UV light damage (welder, snow), dendritic pattern – HSV keratitis.
5. Corneal FB: Sx similar to corneal abrasion; if high velocity mechanism, suspect rupture and consider orbital CT.
 - Document Seidel sign, pupil shape, etc. Abx drops pre and post removal & update Td.
 - Close F/U.
6. Chemical Burns:
 - Acidic burns cause coagulative necrosis and are more self-limiting (battery acid, glass polish, bleach, vinegar).
 - Alkali burns cause liquifactive necrosis and are more dangerous (fertilizer, cleaners, fireworks).
 - Tx with immediate irrigation and recheck pH q 10 minutes.
 - Ophtho consultation and pain meds.
 - Superglue Exposure (Cyanoacrylate): initial attempts to decontaminate with Erythromycin ointment ok. Then d/c home with ointment (5x per day) and 48 hour ophtho f/u if not sooner.
7. Globe Rupture:
 - Diagnostic signs include: seidel's sign (streaming fluorescence), teardrop-shaped pupil, subconjunctival hemorrhage, flattened AC, hyphema.
 - Usually occurs in setting of high-speed FB (metal on metal).
 - Tx: upright position, NPO, eye shield, ancef/Td, CT orbits to r/o FB, and emergent ophtho consult.
8. Hyphema: Blood in the anterior chamber.
 - Usually hx of trauma and decr vision/pain; blood in AC; pupil reacts normally; may have pain, photophobia, decr acuity.

- Microhyphemas can be treated on an outpatient basis, unless secondary hemorrhage occurs or elevated intraocular pressure is uncontrolled. Eye patch, elevate head, cycloplegics (dilates pupil to avoid constriction/dilatation that may cause rebleeding), mannitol (decreased IOP) and avoid anti-platelets.
 - If the hyphema occupies more than one third of the anterior chamber, intraocular pressure is elevated beyond 30 mm Hg, or both, hospitalization is recommended.
 - Tx goals are to reduce rebleeding and prevent glaucoma.
9. Iridodialysis: iris tears from the ciliary body (appears like 2nd pupil).
 10. Retrobulbar Hemorrhage: essentially a compartment syndrome of the globe/eye socket.
 - Presents following trauma with: proptosis, pain, incr IOP. CT scan can help differentiate indeterminate cases.
 - Tx: topical B-blocker (Timolol), CA inhibitor (Acetazolamide), Mannitol, Lateral canthotomy.
 11. Traumatic Iritis:
 - Presents with: photophobia, deep aching pain, ciliary flush, cells/flare, constricted pupil.
 - Tx: pain control and topical cycloplegics.
 12. Retinal Detachment:
 - Presents with sudden vision loss secondary to trauma; painless, no pupil changes.
 - Emergent ophtho consultation.

VII. Neuro-ophthalmology and Other

1. Anisocoria: occurs naturally in 20% of the population. First determine which pupil is normal and which is abnormal.
 - Equally reactive pupils implies Horner's syndrome¹ (assoc sx include ptosis, anhydrosis, and weak dilation with drops) or physiologic anisocoria.
 - Abnormal response to light implies problem with the iris, Adie's tonic pupil (will constrict dramatically with 0.1% Pilocarpine), CNIII palsy² (with 1% Pilocarpine both pupils constrict), or iatrogenic from drops (with 1% Pilocarpine, neither pupil constricts).
2. Cavernous Sinus Thrombosis: patients typically present with headache, n/v, vision loss, eye edema, diplopia, proptosis, +/- CNVI palsey.
 - Workup may include head CT.
 - Tx with heparin and abx if indicated.
3. Optic Neuritis: gradual unilateral loss of vision over hours-days; Pain with movement of the eye; +/- afferent pupillary defect.
 - Tx with IV steroids and ophtho f/u and r/o MS.
4. Giant Cell Arteritis: unilateral painless acute vision loss; +/- afferent pupillary defect, HA, jaw claudication, ESR > 55.
 - Tx: steroids and admission for TA biopsy (definitive diagnosis).
5. Pseudotumor Cerebri (Benign Malignant HTN); stereotypical group is overweight female, pregnant, htn, ocp use;
 - Pts present with HA, n/v, vision loss (transient), +/- CNVI palsey, papilledema.
 - R/O intracranial mass with CT and then LP will demonstrate elevated OP.
6. Diabetic Retinopathy: in proliferative retinopathy, vessels can bleed causing vitreous hemorrhage or retinal detachment.
 - Gradual changes occur secondary to macular degeneration, ischemia, cataract formation.
7. Argyll-Robertson Pupil: pupil accomidates but won't react (midbrain problem; can be neurosyphilis).
8. Marcus Gunn Pupil: Afferent Pupillary Defect (APD): globe vs. optic nerve defect.
9. CN III Palsey: pupil-sparing (DM); pupil-involved (aneurysm); PS nerves are external.
10. Horner's Syndrome: CN III sympathetic involvement; ptosis, miosis, anhydrosis (pancoast tumor, carotid injury).
11. Hypertensive Retinopathy: chronicity causes AV nicking then copper wire arterioles.
 - Can eventually lead to proliferative retinopathy.

VIII. Ophtho Meds:

1. Dilators (Red Cap) - Atropine, Homeatropine – used to relax ciliary body. Never use with acute angle glaucoma).

2. Tetracaine: should improve sx in corneal abrasion; will not improve pain in uveitis/iritis.
3. Constrictors (Miotics): used in acute angle glaucoma.

Footnotes:

¹Causes of Horner's Syndrome: lung mass, ICA dissection/aneurysm, brachial plexus injury, aortic aneurysm, infarction.

² CNIII Palsy: with pupillary involvement, a true emergency; (D/Dx: CVA, uncal herniation, giant cell arteritis, posterior communicating aneurysm, demyelinating disease). Often associated with ptosis and decreased ROM (CNIII). If pupillary response is normal, must exclude poster. Communicating aneurysm. IF light reflex is normal – usually secondary to DM or HTN (Symp nerves controlling pupillary response are carried peripherally on CNIII).

Bibliography

1. Cuculino GP, DiMarco CJ, Mahadevan SV. Common ophthalmologic emergencies: a systematic approach to evaluation and management. *Emergency Medicine Reports* 2002;23(13):163-176.
2. Multiple issues of *Emergency Medicine*; 2005 – 2006 era.
3. Ma & Cline. *Emergency Medicine – Just the Facts*, 2nd Edition.
3. Dr. Darryl Harrington at Harbor-UCLA intern lecture series, 2003-2004.