**Visual Acuity** - The vital sign of the eye

- Make sure it is done in triage
- If not done, get it done ASAP- hanging eye chart in the ED or iPhone app (EyeChart- Free at Apple Store)
- If patient can’t see anything- can they see fingers, light, or motion
- If patient doesn’t have glasses/contacts- use a pinhole viewer or poke a hole in an index card/piece of paper and have patient hold up to their eye

**PEARL** - Only exception to getting a visual acuity first is a chemical burn to the eye- “test answer” is to get patient irrigated first with copious amounts of water (see section on chemical burns)

**History**
- Trauma to the eye, foreign body, or chemical burn?
- Symptoms gradual or sudden?
- Red eye or discharge? Wake up with eyes matted shut?
- Vision loss?
- PMH- Contacts (VERY IMPORTANT TO ASK!)
- Glasses? Last time saw an optometrist/ophthomologist?
- Hx of eye issues and full PMH, PSH, allergies, meds, etc.

**Exam**
- External eye exam- Compare eyes side by side- redness, sclera bleeding, conjunctival injection, lid droop,
- Extra-Ocular movements- trace the H, test accommodation
- Palpate the orbital area for any tenderness/swelling
- Ophthalmoscope exam- check pupil reactivity, bleeding in sclera (subconjunctival hemorrhage), hyphema (blood in anterior chamber)
- Also check for any opaque spots on the cornea (corneal infiltrates/ulcers)- important for corneal abrasions in contact lens wearers
- Evert the eye lids- check for foreign bodies of upper and lower lids, can take moistened cotton swab and wipe inside of eyelids to be sure- foreign bodies can easily hide in the lids

**Topical Anesthesai**
- Trauma to the eye can be incredibly painful
- 1-2 drops of tetracaine or proparacaine for pain control/facilitate exam
- Warn the patient that it will sting a little but will feel better- coach them
- Can’t send patient home with it (will use too much and impair healing) but small study says dilute proparacaine is ok- needs further study

**Fundoscopic exam**
- Look for papilledema and changes suggestive of central retinal artery/vein occlusion (see section on CRAO/CRVO)
- Pan-opthalmoscope is much easier to use
- Check embasic.org for videos on how to do this exam effectively

**Slit lamp exam**
- Takes a lot of practice- do it on every eye patient to get good at it
- Check embasic.org for videos on how to do this
- Turn off light and lock lamp into place after exam to prevent damage

**Flourescin exam**
- Need flourescin strip, saline, wood’s lamp
- Take patient’s contacts out (flourescin will permanently stain them)
- Put strip just above patient’s eye, put drop of saline onto strop and let it roll into patient’s eye
- Darken room, turn on wood’s lamp and examine for any dense, opaque uptake in corneal- will fluoresce = corneal abrasion
- Vertical corneal abrasions = probable upper eyelid foreign body
- Dendritic lesions (herpes simplex infection of eye)
- Sidell’s sign- river of flourescin flowing- indicates open globe

**PEARL** - For routine flourescin exam, don’t have to physically touch the patient’s eye with flourescin strip- technically you should for sidell’s sign but may see it without “painting” it on the eye- try doing it first without touching the eye, if negative then can touch the eye if trauma/suspicious
Intra-ocular pressure (IOP)

- Done after you have ruled out an open globe - check a sidell’s sign or defer exam if you are very suspicious of one
- Apply topical anesthesia first
- Calibrate tonopen (most common brand in US) - put cover on, press button, hold tip down, flip up quickly to the ceiling when it says “UP”
- Hold patient’s eye open, hold tonopen perpendicular to center of pupil, tap lightly multiple times
- Will hear a soft, quick beep with each tap, keep tapping until you get a long, loud beep
- Check the measurement - normal IOP is 10-20

Final part of exam - do a head to toe exam - don’t miss anything!

Common eye diagnoses with treatments

Corneal abrasions - caused by foreign body or blunt trauma to the eye, dense uptake on flourescen exam
- Treatment - pain control and antibiotics (patching doesn’t work)
- Pain control - tetracaine/proparacaine in ED only, discharge with Tylenol/motrin +/- oxycodone/hydrocodone (vicodin/percocet)
- Antibiotics

Contact lens wearer - have to cover pseudomonas and throw out current contacts, no wearing until they see ophth in followup
  - Polymixin/trimethoprim (polymixin)
  - Ciprofloxacgin (Ciloxan)
  - Ofloxacin (Oculflox)
  - Tobramycin (Tobrex)

PEARL - For contact lens wearers, make sure to check cornea for white spots = infiltrates = ophth referral that same day

Non-contact lens wearers - can use erythromycin ointment instead (doesn’t cover pseudomonas but cheap and easier to use in kids) or any of the above antibiotics

Subconjunctival hemorrhage - usually a benign diagnosis - patient freaked out when they or someone else notices blood in sclera - should be painless - usually something more serious if associated with pain
- Can be spontaneous or related to vomiting, coughing, child birth

Hyphema

- Usually a result of trauma but can be spontaneous in those with sickle cell
- Blood collects in anterior chamber
- If hyphema + open globe - emergent ophth consult
- Head of bed to 30 degrees, eye drops as advised by ophth

Usually admitted but some studies say outpatient management ok in select cases (about 5% will require surgery)

Extra-ocular muscle entrapment

- Usually a result of direct orbital trauma - pt complains of double vision
- May be able to see EOM deficit on exam
- CT orbits to make diagnosis
- Ophth, ENT, or Oral Maxillofacial Surgery consults or transfer as appropriate (institution and call schedule dependent)

Retrobulbar hematoma

- EXTREME ocular emergency
- Suspect this if orbit is tense and/or large difference in IOP in setting of trauma
- If not rapidly decompressed, can lead to vision loss
- See section on lateral canthotomy below

Chemical burns

- Important - what patient got in their eye (alkalais worse than acids)
- With few exceptions - need copious irrigation with water/saline until pH is normal (6.5-7.5)
- Give topical anesthesia as well
- Can do this at sink or with bottle of water/saline or morgan lens
- Can also use a bag of saline attached to nasal cannula placed over nose
- Exceptions - elemental metals (sodium/potassium), dry lime, sulphuric acid (drain cleaners) - water will make worse - brush off chemical first
- If job related exposure - should have materials safety data sheet (MSDS) available or look this up online
**Foreign bodies** - if any doubt as to foreign body (for example - working with metal grinder but nothing on external exam), get CT orbits. Ultrasound may be more sensitive but CT shows damage caused by FB

**Conjunctivitis**
- Can be viral or bacterial
- Bacterial usually purulent discharge, viral watery d/c but lots of overlap
- Difficult to determine viral vs. bacterial - usually err on side of treatment
- Antibiotics - same as corneal abrasion including differences between contact lens wearers and non-wearers - throw out contacts as well
- Safe answer is to refer contact lens wearers for optho followup but probably overkill

- **Hyperacute conjunctivitis caused by gonorrhea** - can occur only 12 hour after exposure - copious purulent discharge that happens suddenly - needs admission for IV and topical antibiotics, observation for perforation

**Herpes simplex infection**
- Pain +/- vesicles in V2 distribution on face
- Dendritic lesions on fluorescein exam (see above)
- Ophtho consultation for further management

**Acute angle glaucoma**
- Older patient with sudden eye pain and unilateral vision loss
- Usually when going into dark room, pupil dilates which blocks outflow of vitreous humor through canal of schlemm
- Diagnosis hinges on large difference in IOP between eyes
- Treatment - lower IOP
  - Timolol and pilocarpine eye drops
- With ophtho input - prednisolone and acetazolamide IV

**PEARL** - don’t use acetazolamide in patients with sickle cell

**Central Retinal Artery Occlusion** - acute clot in retinal artery
- Painless unilateral loss of vision with cherry red spot on macula or whitening of retina on fundoscopic exam
- Usually has risk for clot or emboli like a-fib
- Intermittent digital massage of eye to dislodge clot
- Lower IOP with timolol, pilocarpine, acetazolamide
- Rebreath into paperbag to increase CO2 and lower IOP
- May need paracentesis of anterior chamber
- IV TPA has been used but not standard treatment

**Central Retinal Vein Occlusion**
- Sudden painless unilateral vision loss
- Same treatments to lower IOP
- Much more often surgical management

**Retinal Detachment**
- Spots and floaters in patient’s vision
- Can use ultrasound for diagnosis but not highly sensitive
- If suspicious, consult ophtho

**Lateral canthotomy**
- If suspecting retrobulbar hematoma - cut first, ask questions later
- If you do in unnecessarily - not a big deal - usually heals on its own, if you don’t do it and patient needed it - permanent vision loss
- Numb up lateral canthal area with lidocaine with epi, procedural sedation PRN but preferred without - want to ask patient if vision better
- Clamp lateral orbit with hemostat for 30-60 seconds to devascularize
- Cut laterally with scissors (iris scissors if you have it, otherwise any scissors from laceration tray should work)
- Then cut superior and inferior tendon, check patient’s eye and IOP to see if it worked
- If it didn’t work, re-cut and be more aggressive - most common area is not actually snipping the tendons
Links

**Slit lamp exam** - 24 minutes but excellent and great videos of actual exams- worth watching the whole thing

https://www.youtube.com/watch?v=w9wMJ6job_0

**Fundoscopic exam** - kinda cheesy but effective

https://www.youtube.com/watch?v=wPzCA9k8GRQ

**Pan-ophthalmoscope** - https://www.youtube.com/watch?v=a9rhPWqV_ac

**Ocular ultrasound** - from the ultrasound podcast

**Lateral Canthotomy on a cadaver**

http://www.youtube.com/watch?v=cAYBGW3c95M

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