

Chapter 22 – Red and Painful Eye

Episode overview:

- 1) Describe the Relative Afferent Pupillary Defect, how it is diagnosed, and list a differential diagnoses for this finding
- 2) List 6 treatment options for Acute Angle Closure Glaucoma
- 3) Describe 5 history or physical exam findings that distinguish between periorbital cellulitis and orbital cellulitis

Wisecracks

- 1) What are the causes of exophthalmos?
- 2) How can you differentiate between viral and bacterial conjunctivitis?
- 3) Causes of anisocoria?

Rosen's in Perspective:

- Review your eye anatomy in Rosen's

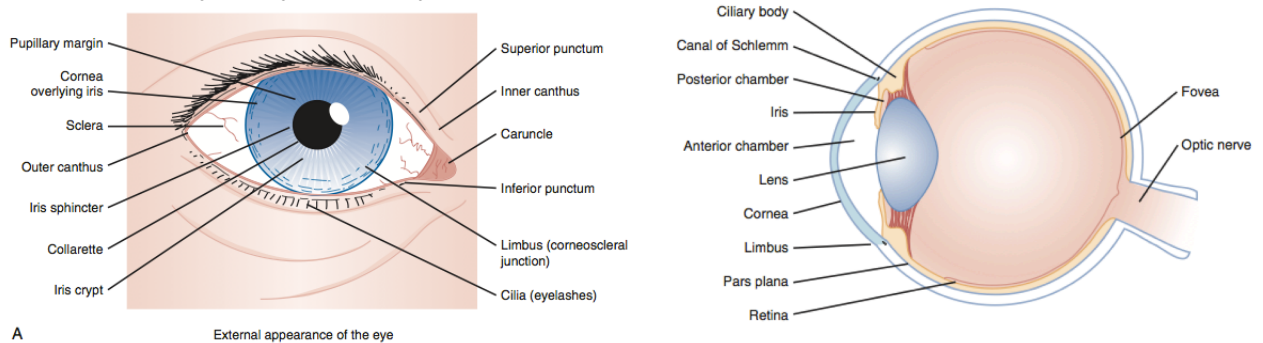


Figure 22-1. External (A) and internal (B) anatomy. (From Ragge NK, Easty DL: Immediate Eye Care. St Louis: Mosby-Year Book; 1990.)

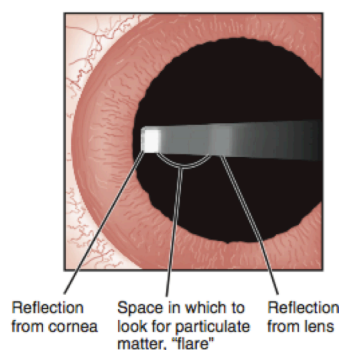
- Recap the key components of the eye exam:

Eight Key Components: **VVEPP + Slit Lamp + Fundoscopy**

VVEPP

- Visual acuity (Vital Sign)
- Visual field testing
- External examination
- Extraocular movements
- Pupillary evaluation
- Pressure Determination

Slit Lamp



Fundoscopy

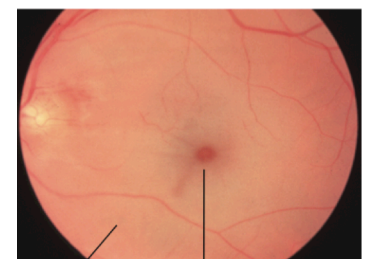
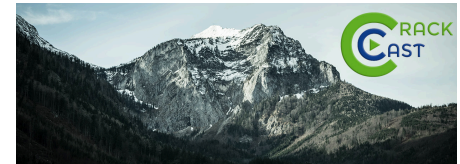


Figure 22-3. Technique of slit-lamp examination with a short, narrow light beam projected from an extreme temporal angle across the contrasting black pupil to better find cells or "flare" indicative of acute anterior uveitis. (From Ragge NK, Easty DL: Immediate Eye Care. St Louis: Mosby-Year Book; 1990.)



VVEEPP Explained

1. V: Visual acuity (vital sign of the eye):
 - a. Snellen eye chart at 20 feet or Rosenbaum chart at 14 inches
 - b. Allen chart for young children and infants
 - c. If they cannot use the chart:
 - i. Are they able to read the paper/phone?
 - ii. Counting fingers
 - iii. Perceive hand motion
 - iv. Able to perceive light

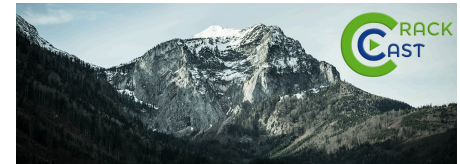
2. V: Visual field testing
 - a. Confrontational field testing (*not* accurate for small field cuts)
 - i. But this rarely changes the ED management

3. E: External examination
 - a. Of both external eyes and surrounding structures (facial bone fracture, etc.)
 - b. Globe position: exop/enophthalmos (proptosis)
 - c. Conjugate gaze
 - d. Periorbital soft tissues, bones, sensation
 - i. Examination of upper a lower eyelids, *including eversion****
 1. Ensure no foreign body
 - ii. Assess adjacent structures

4. E: Extraocular muscle movement
 - a. Assess the eyes through ALL the cardinal movements of gaze
 - b. Inquire about diplopia (especially at the extremes of gaze)
 - i. This may suggest ocular muscle entrapment, or functional edema

5. P: Pupillary evaluation
 - a. Assess size, shape, reactivity
 - b. Assess for RAPD using the swinging flashlight test

6. P: Pressure determination
 - a. Intraocular pressures normally 10-20 mmHg
 - b. IO HTN Differential Diagnosis:
 - i. Glaucoma
 - ii. Suprachoroidal hemorrhage
 - iii. Retrobulbar pathology
 - c. Pressures in the 20-30 range should get ophthalmology follow-up
 - d. Pressures OVER 30 mmhg need **rapid** treatment



Slit lamp examination - explained

- A systematic, magnified view of the conjunctivae and anterior chamber
- Will not help you with something *posterior* to the lens

- Lids and lashes
 - Blepharitis
 - Hordeolum (lid abscess)
 - Dacryocystitis

- Conjunctiva and sclera
 - Punctures, lacerations, inflammatory patterns

- Cornea (with fluorescein)
 - Abrasions, ulcers, foreign bodies
 - Angled beam is needed to assess depth perception
 - Edema (white haze / cloudiness)

- Anterior chamber
 - Cells (RBCs or WBCs) and flare (diffuse haziness)
 - Hyphema or hypopion
 - Foreign bodies

- Iris
 - Red light reflex
 - Tears in the iris - iridotomy

- Lens
 - Position,
 - Clarity
 - Cataracts
 - Artificial vs. native lens

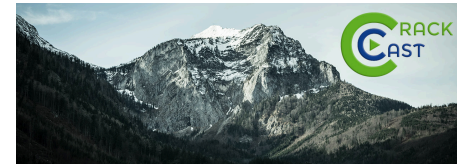
Fundoscopy - explained

To help in you in cases of:

- Visual loss and/or vision changes
- Can find lens dislocation

- Non-dilated exam is commonly performed in the ED
 - Because of the risk of causing AACG (acute angle closure glaucoma)

- **Inability to obtain the red light reflex (pearl)**
 - Corneal opacification
 - Hyphema or hypopion
 - Miotic pupil
 - Lens cataracts
 - Blood in the vitreous
 - Retinal detachment



Bedside testing:

- Fluorescein testing - uptake occurs only in damaged corneal tissue.
 - Under slit-lamp Cobalt blue light:
 - Have the patient blink, if there is uncertainty regarding the uptake of fluorescein on the cornea
- Local anesthetic testing:
 - If the anesthetic abolishes the patient's eye pain - the pain is of corneal origin
 - If the pain is mildly relieved - probable conjunctival origin
- Seidel's sign:
 - Use with the suspicion of ocular penetration
 - Leaking aqueous fluid is detected by diluted fluorescein.
 - The fluorescein strip **MUST BE HELD DIRECTLY OVER THE SUSPECTED AREA OF CORNEAL DISRUPTION**

Ancillary testing:

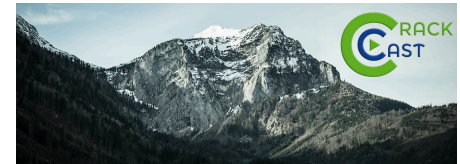
- ESR and CRP - may help in cases where temporal arteritis is suspected
 - ****however TA can occur with NORMAL levels of ESR and CRP****
- CT orbits and facial bones to rule out free air, FB's, fractures,
- Ultrasound - good at detecting foreign bodies, but CT is better at delineating the damage caused by intraocular foreign bodies

1) Describe the Relative Afferent Pupillary Defect, including:

- **How it is diagnosed**
- **List a differential diagnosis**

Assess for RAPD using the swinging flashlight test:

- i. Patient looks at a distant object
- ii. Room lights are dimmed
- iii. Flashlight is swung from one eye to the other (not obstructing their visual line)
- iv. The direct and consensual light reflexes are assessed
 - a. These are mediated through cranial nerves - the afferent, or sensory, limb corresponds with the optic nerve (CN II), while the efferent, motor, limb corresponds with the oculomotor nerve (CN III) "Two In, Three Out"
 - b. **Is positive** if the pupil dilates with the direct beam of light, while constricting with consensual response.
- v. Causes of RAPD - the sensory, CN II, is not functioning
 - a. Inhibition of light transmission to the retina
 - i. Vitreous hemorrhage
 - ii. Loss of the retinal surface
 - iii. Ischemia or retinal detachment
 - iv. Prechiasmatic optic nerve lesion - optic neuritis



2) List 6 treatment options for Acute Angle Closure Glaucoma

Acute angle closure glaucoma:

Symptoms:

- Sudden onset eye pain and blurred vision, with frontal headache, N/V, shallow anterior chamber, fixed mid-dilated pupil, limbal injection

Treatment:

- Decrease production of Aqueous Humour*
 - Timolol 0.5% 1 drop, then repeat in 30 minutes
 - Apraclonidine 1% 1 drop once
 - Acetazolamide 500 mg PO - to reduce aqueous humour production
 - Methazolamide 50 mg PO instead of acetazolamide if the patient has sickle cell disease
- If IOP > 30 (emergency)*
 - Constrict pupil
 - Pilocarpine 4% 1 drop, then repeat in 15 minutes
 - Establish an osmotic gradient:
 - Mannitol 2 g/kg IV
- Decrease IOP (other treatments)*
 - Head of bed at 30 degrees
 - Anti-emetics for prevention of N/V and prevent coughing
 - Analgesics
- Decrease inflammation:*
 - Prednisolone 1% 1 drop q 15 minutes

Just to recap; in order of importance:

1. Timolol
2. Acetazolamide
3. Head of bed at 30 degrees, prophylactic anti-emetics, and analgesics

3) Describe 5 History or Physical exam findings that distinguish between peri-orbital and orbital cellulitis

Orbital (or post-septal) cellulitis

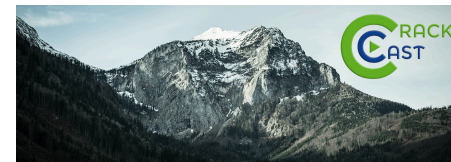
Etiology

- Maxillary/ethmoid sinusitis
- Orbital trauma
- Dental infection

Need CT to rule out abscess

Symptoms

- Eyelid swelling / redness
- Warmth of skin overlying orbit
- Tenderness over bone
- Palpebral injection/chemosis of the conjunctiva



Important Differences to Periorbital Cellulitis

- Fever
- Ill / Toxic appearance
- Blurred vision
- Proptosis
- Painful or limited extraocular movements
- Binocular diplopia
- Edema of optic disk
- Venous engorgement of the retina

Management

Further Work Up

- Measure IOP, if >20 may need surgery
- Blood cultures
- CT orbits to rule out:
 - Foreign body
 - Emphysema
 - Hematoma
 - Abscess
 - Osteomyelitis
 - Cavernous sinus thrombosis
- Consider *lumbar puncture*
- Admission to hospital

Treatments

IV Antibiotics for **skin and sinus** flora

Pip-Tazo 4.5g IV **plus**
Vancomycin 15-20mg/kg IV

OR

Ceftriaxone 2g IV **plus**
Metronidazole 500mg IV

Complications:

- Meningitis
- Cavernous sinus thrombosis

Periorbital cellulitis (or pre-septal)

Etiology

- Bug bite
- Trauma
- Sinusitis

Symptoms

- Lid erythema, warmth, tenderness, and swelling
- Low grade fever

Considerations

- Mostly in children
- RARELY leads to orbital cellulitis
- Usually strep/staph species

Treatments

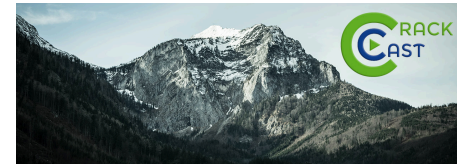
MILD CASES

- Clindamycin 300mg PO q8hrs x 10 days **OR**
- Clavulin 875 PO BID x 14 days + Septra double strength TID x 10 days

MODERATE-SEVERE CASES or <1 year old

- Ceftriaxone
+ Vancomycin or Clindamycin

Someone with periorbital cellulitis has no worrisome features and typically normal CT scan. They rarely progress to orbital cellulitis but should have pediatric or ophthalmologic follow-up



Wisecracks:

1) What are the causes of exophthalmos?

- These **ALL** increase the intraocular pressure
 - Orbital cellulitis with/without abscess
 - **Retrobulbar hematoma** (most common)
 - Hyperthyroidism (enlarged ocular muscles)
 - Orbital emphysema or inflammation (retained foreign body)

What are the causes of enophthalmos?

- Contralateral proptosis
- Penetrating globe injury causing vitreous extrusion

2) How to differentiate between bacterial vs. viral conjunctivitis?

- Still **NO** good evidence exists to distinguish between the two
 - Weak positive LR of 3.1 for bacterial **IF**
 - Sticking eyelids in the AM plus mucoid/purulent discharge

3) What are the causes of Anisocoria?

- i. Previous eye trauma
 - Globe injury
 - Afferent or efferent nerve dysfunction
 - Ciliaris or iris paralysis
- ii. Previous eye surgery (iridotomy)
- iii. Synechiae from prior iritis
- iv. Physiologic (up to 10% of the population)
- v. Medication related (drugs)
- vi. **Serious causes:**
 - a. **Uveitis**
 - b. **AACG**