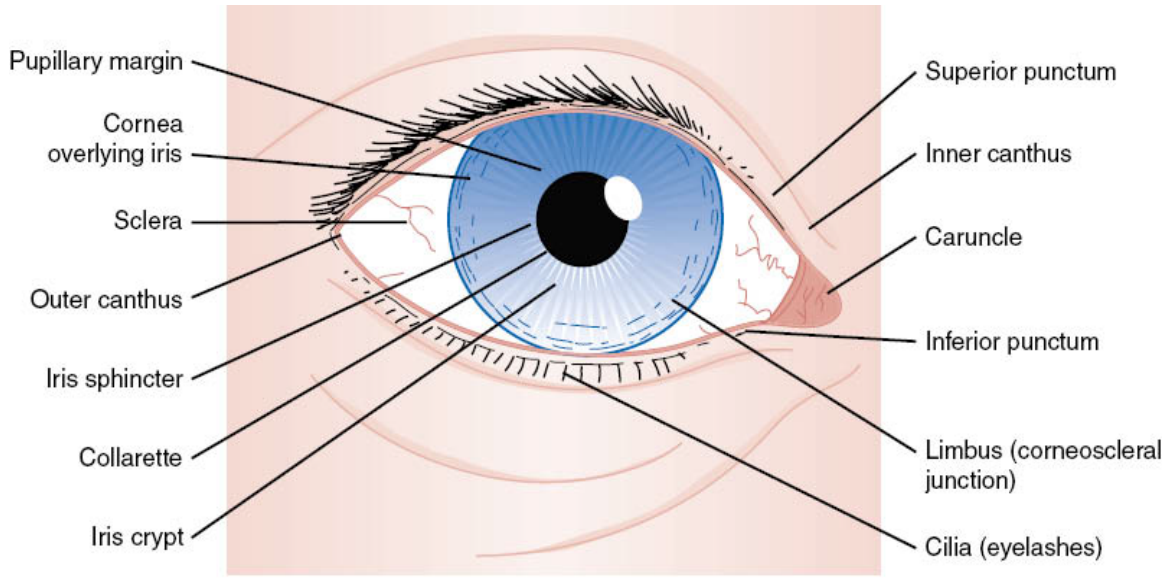
APPROACH TO THE RED AND PAINFUL EYE

REDNESS REFLECTS VASCULAR DIALTION AND USUALLY REFLECTS INFLAMMATORY PROCESSES OF THE EYE OR SURROUNDING TISSUES

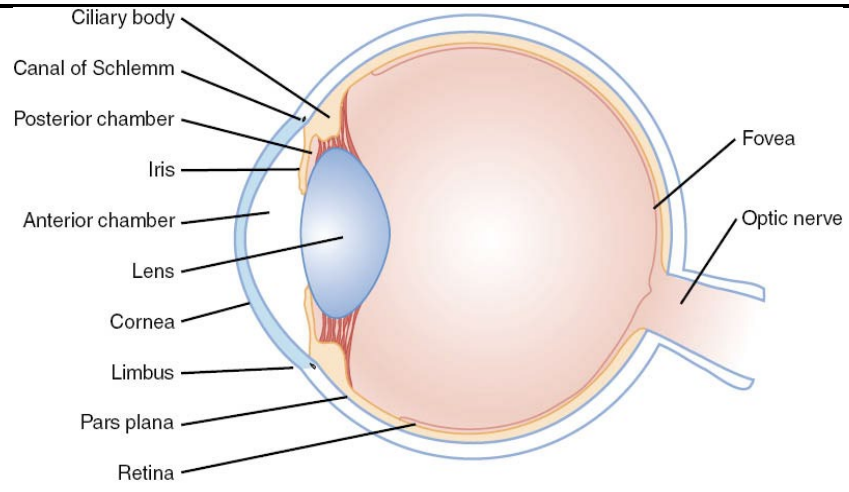
EYE PAIN MAY ORIGINATE FROM THE CORNEA, CONJUNCTIVA, IRIS OR VASCULATURE

THE FIRST QUESTION TO ASK IS "DID ANYTHING GET IN YOUR EYE?" AND IF SO "WHAT DO YOU THINK IT IS?" → THIS HELPS DIFFERENTIATE TRAUMATIC FROM NON-TRAUMATIC CAUSES, WHICH IS A CRUCIAL BRANCH POINT IN THE DIFFERENTIAL DIAGNOSIS

BASIC ANATOMY



A External appearance of the eye



B Cross section of the eye

PIVOTAL FINDINGS:

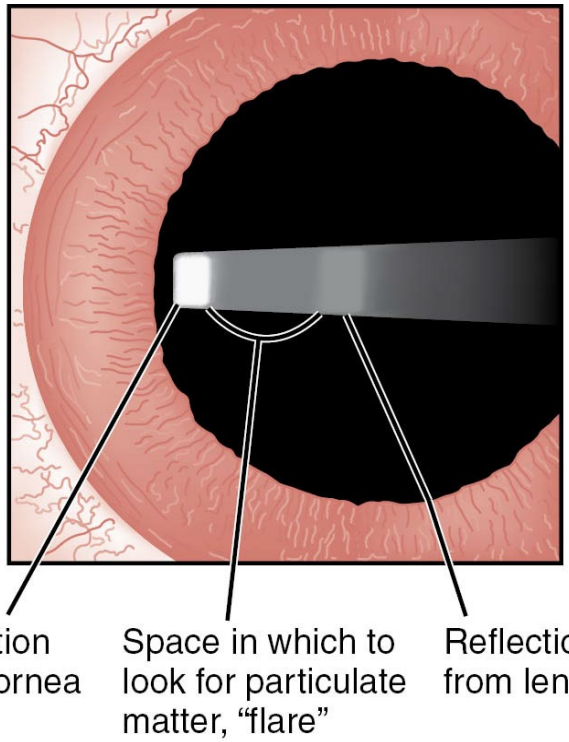
HISTORY:

- Itching → associated with blepharitis, conjunctivitis (especially allergic) or dry eye syndrome
- Dull pain → manifestation of raised intraocular pressure, or referred from extraocular processes → sinusitis, migraine, temporal arteritis
- Sharp pain → abnormalities of the anterior eye → keratitis, uveitis, acute angle-closure glaucoma
- Foreign body sensation → corneal irritation/inflammation
- Chief complaint of redness commonly result from palpebral or limbal injection of the conjunctiva
    - Free blood can be noted behind the bulbar conjunctiva (subconjunctival haemorrhage) or anterior chamber (HYPHAEMA) → can be spontaneous or post-traumatic
    - Presence of pain with subconjunctival haemorrhage raises prospect of more sinister pathology, such as direct globe injury
    - Other subjective findings may be lid swelling, discharge, crusting or photosensitivity
- Other crucial questions include:
    - Are contact lenses used → how often changed/what type/how often cleaned
    - Are glasses worn?
    - Previous eye surgery or injury?
    - Usual health? i.e. background medical history
    - What medications?
    - What allergies? Especially environmental allergies.

PHYSICAL EXAMINATION:

- Complete eye examination comprises of EIGHT COMPONENTS:
    - VVEEPP plus fundoscopy and slit lamp examination
    - V → VISUAL ACUITY (BEST, i.e. with glasses/contacts if they wear them):
        - If unable to read anything on Snellen's chart → go to count fingers (CF), then hand motion (HM) then light perception (LP)
    - V → VISUAL FIELDS:
        - Hemi or quadrantanopia more likely related to neural problem
    - E → EXTERNAL EXAMINATION → globe position in orbit (enophthalmos → worst cause is extrusion of vitreous from penetrating eye injury, exophthalmos→ worst cause is retrobulbar haemorrhage), conjugate gaze, periorbital swelling/soft tissues, sensation
    - E → EXTRAOCULAR MUSCLE MOVEMENT
    - P → PUPILLARY EVALUATION → both absolute and relative:
        - Physiologic ANISCORIA (slight difference in pupil size and occurs normally in 10% of population)

        - Pathologic reasons for failure of one pupil to constrict with direct light stimulus include globe injury, abnormalities of afferent or efferent nerve, UVEITIS OR ACUTE ANGLE CLOSURE GLAUCOMA.
        - Swinging flashlight test to DETERMINE PRESENCE OF RELATIVE AFFERENT PUPILLARY DEFECT (RAPD)
            - When the light source shines into an eye with an RAPD, the pupil PARADOXICALLY DILATES because the consensual response from withdrawal of light form the opposite eye with normal afferent activity is stronger than the direct constrictive response
            - RAPD can be due to:
                - Inhibition of light transmission to the retina because of vitreous haemorrhage, loss of some/all of the retinal surface for light contact because of ischaemia (arterial occlusion) or detachment, or because of lesions affecting the prechiasmal optic nerve (e.g. OPTIC NEURITIS)
    - P → PRESSURE DETERMINATION → tonometry
- SLIT LAMP EXAM:
    - Lids and lashes
    - Conjunctiva and sclera
    - CORNEA → for ulcers, abrasions, foreign bodies
    - ANTERIOR CHAMBER → examined for cells (think uveitis), layers of red cells (HYPHAEMA), pus (HYPOPYON) → graded by percentage of vertical diameter of visible iris when head is upright



HYPHAEMA

HYPOPYON

- LENS CLARITY AND IRIS DETAIL ALSO ASSESSED AT SLIT LAMP EXAMINATION
- FUNDOSCOPIC EXAMINATION:
    - Look for presence of red reflex, the absence of which can be due to:
        - Opacification of the cornea (most often due to oedema secondary to inflammation)
        - Hyphaema/hypoyon
        - Extremely miotic pupil
        - Cataract of the lens
        - Blood in the vitreous or posterior eye wall
        - Retinal detachment
    - In the absence of trauma, few posterior findings are associated with the chief complaint of external redness

MORE SERIOUS FINDINGS THAT PORTEND A SERIOUS DIAGNOSIS:

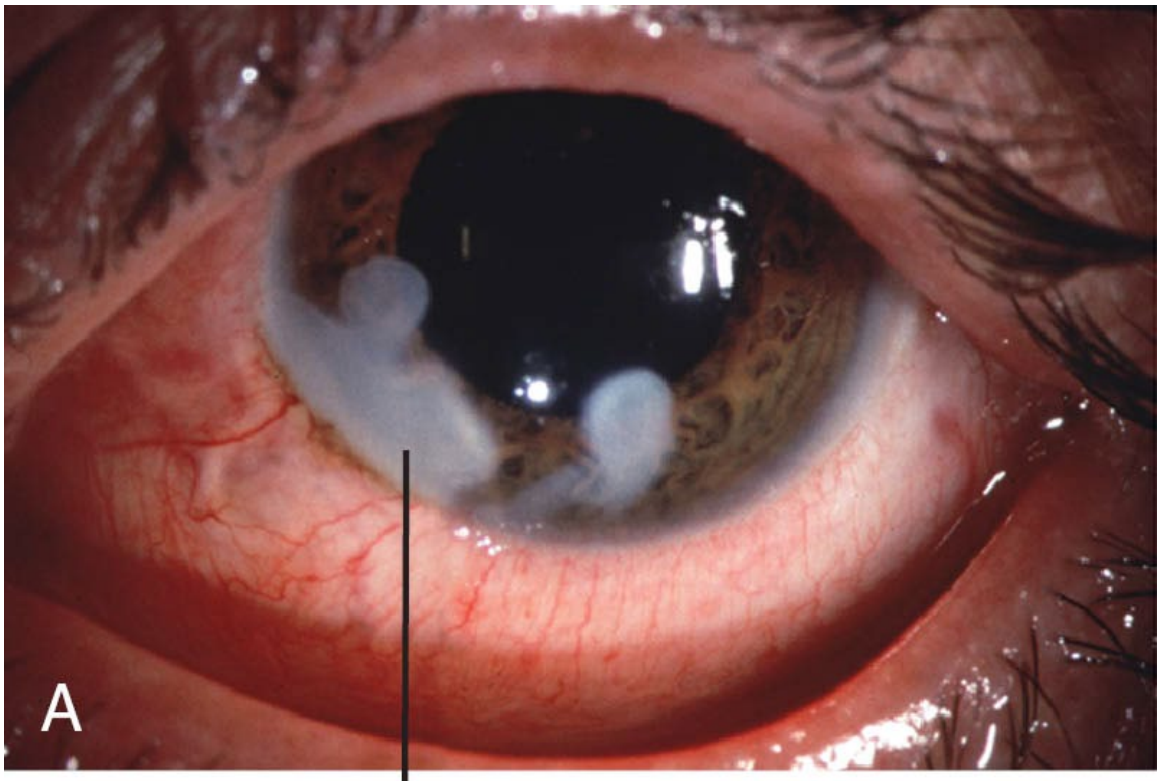
- Severe ocular pain
- Persistently blurred vision

- Proptosis
- Reduced ocular light reflection
- Corneal epithelial defect or opacity
- Limbal injection
- Pupil unreactive to difrect light stimulus
- Wears soft contact lenses
- Neonate
- Immunocompromised host
- Worsening signs after three days of pharmacologic treatment

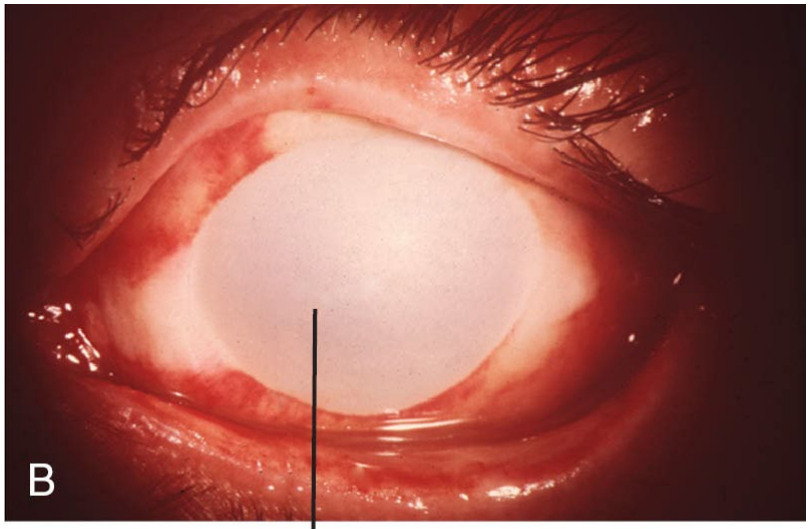
DIFFERENTIAL DIAGNOSIS:

CRITICAL DIAGNOSES:

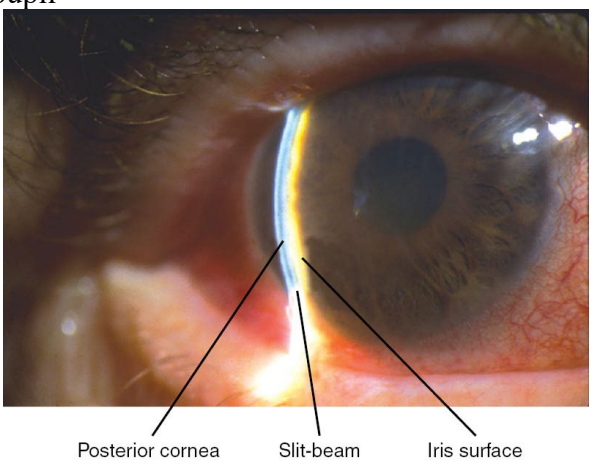
- CAUSTIC INJURY TO THE EYE:
    - Can rapidly lead to destructive keratoconjunctivitis and liquefactive necrosis
    - EARLY AND COPIOUS IRRIGATION IS THE KEY for at least 30 minutes



Corneal alkali burn



- Acid injury is far less severe → tends to cause COAGULATIVE NECROSIS WHICH IS SELF-LIMITING
- ACUTE ANGLE CLOSURE GLAUCOMA:
    - Relatively rare, increased intraocular pressure
    - Sudden onset eye pain, frontal headache, N+V and decreased visual acuity
    - Iris becomes immobile and irregular
    - Fixed pupil

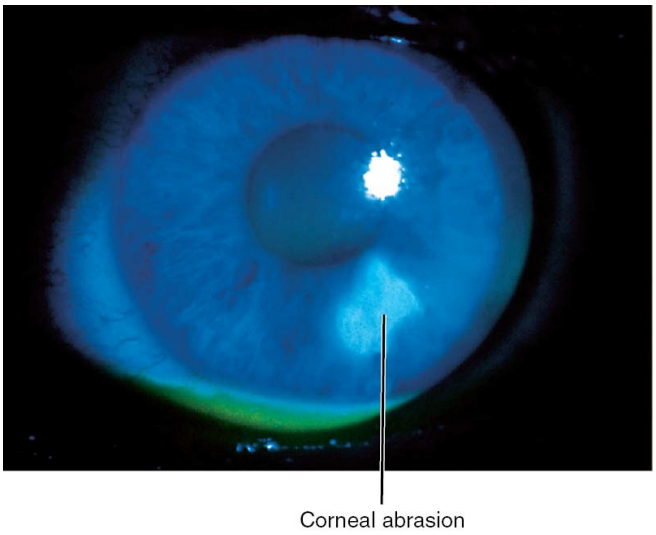


NARROW ANTERIOR CHAMBER ON SLIT LAMP EXAM

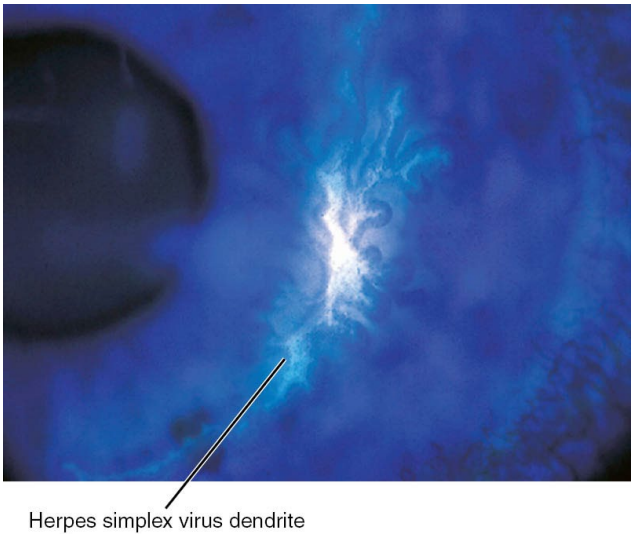
- ACUTE ANGLE CLOSURE GLAUCOMA requires urgent papillary dilation through contraction and thickening of the iris peripherally
- RETROBULBAR HAEMATOMA, usually caused by orbital trauma → CAUSING PROPTOSIS OR EXOPHTHALMOS
    - Also retrobulbar pus or emphysema can occur
    - Elevated intraocular pressure in any of these circumstances constitutes and orbital compartment syndrome and a surgical emergency REQUIRING LATERAL CANTHOTOMY AND CANTHOLYSIS

EMERGENT DIAGNOSES:

- Most emergent diagnoses involve some kind of inflammation secondary to trauma, infection or systemic disease
    - Keratitis, anterior uveitis, scleritis, endophthalmitis
- Keratitis → inflammation of the cornea. Characterised by intense foreign body sensation, ciliary body spasm causing photophobia. Topical anaesthesia causes immediate relief (but only temporary)
- In immunocompetent hosts, corneal ulcerations are most commonly due to overuse of contact lenses
- Corneal abrasion:



- Infections of the cornea with HERPES SIMPLEX can rapidly lead to opacification and significant visual loss → produces characteristic DENDRITIC PATTERN ON FLUORESCEIN POOLING



- SCLERITIS:
  - Rare, difficult to differentiate from episcleritis
  - Pain of sclerritis is typically slower in onset and is described as SEVERE, BORING PAIN that radiates to ipsilateral forehead, cheek or jaw
- ENDOPHTHALMITIS:
  - Usually results from an infection of structures inside the globe
  - Common following penetrating trauma but may begin after haematogenous seeding, especially in an immunocompromised host
  - Unless detected early and aggressively treated, endophthalmitis is devastating and frequently requires ENUCLEATION

MANAGEMENT ALGORITHM FOR DIFFERENT CAUSES OF RED/PAINFUL EYE:

CAUSTIC KERATOCONJUNCTIVITIS:

- Immediate and copious irrigation with sterile saline using Morgan lens if available
- Ophthalmologist MUST COME TO ED if there is any abnormal visual acuity or objective finding on exam
- May be discharged only if tear film pH =7 and no findings on examination except expected inject → follow up next day

BLEPHARITIS:

- Inflammation of eyelid margins often associated with crusts on awakening.
- Artificial tears to dry eye
- Warm compresses on discharge

CHALAZION:

- Inflammation of meibomian gland causing subcutaneous nodule within the eyelid
- Warm compresses to eyelids

DACROCYSTITIS/DACROADENITIS:

- Eye tearing and inflammation of lower eyelid inferior to lacrimal punctum
- First rule out periorbital cellulitis and orbital cellulitis

ORBITAL CELLULITIS:

- Eyelid swelling, redness, warmth of skin, tenderness of skin overlying bone
- Differentiated from periorbital cellulitis by presence of:
    - Fever
    - Ill appearance
    - Blurred vision
    - Proptosis
    - Painful or limited ocular mobility
    - Binocular diplopia
    - Oedema of the optic disk
    - Venous engorgment of the retina
- MEASURE INTRAOCULAR PRESSURE
- Treat to cover sinus/skin flora → augmentin or TIMENTIN/TAZOCIN
- Treat with mydriatics to decrease IOP → timolol, acetazolamide. CT to rule out retrobulbar abscess, superiosteal abscess, osteomyelitis or changes in cavernous sinus

PERIORBITAL CELLULITIS:

- First differentiate from orbital cellulitis
- Eyelid swelling, redness and warmth of skin
- PO antibiotics if not admitting

RETROBULBAR ABSCESS:

- Findings of orbital cellulitis but with raised IOP

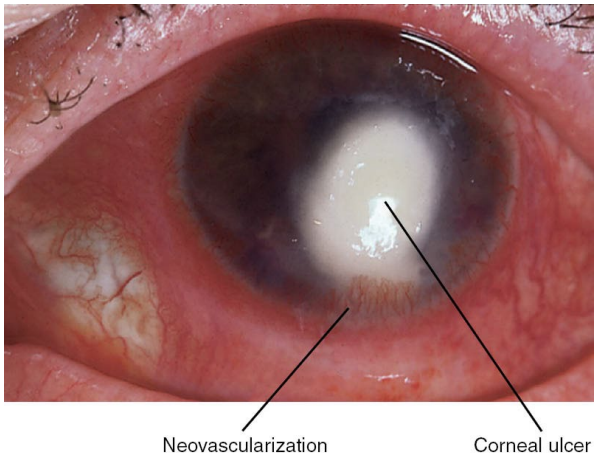
- May need emergent needle aspiration or lateral canthotomy/cantholysis
- ADMIT ALL CASES OF RETROBULBAR PATHOLOGY CAUSING RAISED INTRAOCULAR PRESSURE

RETROBULBAR HAEMATOMA:

- Findings of PSEUDOTUMOUR (eyelid swelling, palpebral injection of conjunctiva, chemosis, proptosis, blurred vision, painful or limited ocular mobility, optic disk oedema, venous engorgement of retina)
- Occurs due to TRAUMA, COAGULOPATHY, THROMBOCYTOPAENIA

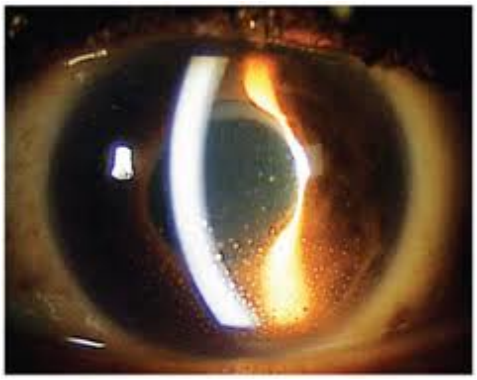
KERATITIS:

- Pain, foreign body sensation, blepharospasm, tearing, photophobia
    - Rule out corneal penetration using SEIDEL'S TEST
- Herpetic infection (HSV, VZV or CMV in immunocompromised) → treat with TRIFLURIDINE, ACICLOVIR OR VIDARABINE
- Bacterial keratitis → relieve pain and blepharospasm with topical anaesthetics. Staph and strep most common → topical chloramphenicol. Suspect PSEUDOMONAS IN CONTACT LENS WEARERS → topical CIPROFLOXACIN



ANTERIOR UVEITIS AND HYPOPYON:

- Eye pain, photophobia, tearing, limbal injection of conjunctiva, cells or flare in anterior chamber
- Hypopyon is layering of white cells in anterior chamber



- **First rule out glaucoma with IOP measurement**
- Liaise with ophthalmology to decide on TOPICAL STEROIDS → DON'T INITIATE WITHOUT INPUT

ACUTE ANGLE-CLOSURE GLAUCOMA:

- Sudden onset eye pain, blurred vision that may be associated with frontal headache, nausea and vomiting
- Anterior eye may manifest shallow or closed angle between iris and cornea
- Pupil fixed in mid-dilation
- TREATMENT AIM IS TO DECREASE PRODUCTION OF AQUEOUS HUMOUR:
    - TIMOLOL 0.5% ONE DROP Q30MIN
    - DORZOLAMIDE/ACETAZOLAMIDE
- DECREASE INFLAMMATION:
    - PREDNISONE
- CONSTRICT PUPIL:
    - Pilocarpine
- Consider establishing osmotic gradient → MANNITOL 2G/KG IV

HYPHAEMA:

- Pain, decreased visual acuity, gross or microscopic blood in anterior chamber
- First rule out globe rupture
- May require ultrasound if cannot visualise posterior structures
- Measure IOP
- Need follow up due to risk of glaucoma
- PO NSAIDS/opiates for analgesia
- Decrease physical activity

ENDOPHTHALMITIS:

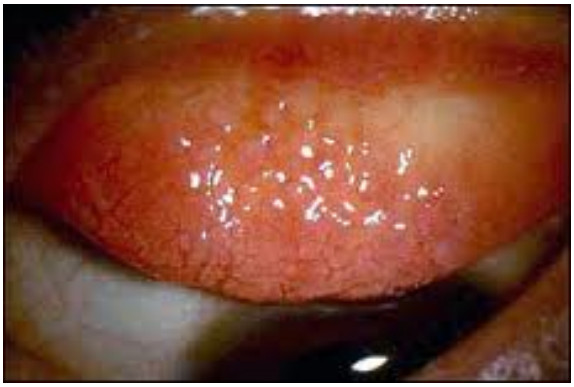
- Progressively increasing eye pain and decreasing vision, diminished red reflex, cells and flare in anterior chamber
- EMPIRICAL PARENTERAL ANTIBIOTICS (CEPHAZOLIN/VANCOMYCIN + GENTAMICIN)
    - Ophthalmology urgently consulted for potential INTRAOCULAR ANTIBIOTICS

CONJUNCTIVITIS:

- **BACTERIAL:**
  - Copious, hyperpurulent discharge, more commonly unilateral. Topical polymixin B for staph or fluoroquinolones for pseudomonal coverage
  - Culture drainage IN ALL NEONATES
    - Neisseria gonorrhoeae can be sight-threatening very quickly

HYPERPURULENT DISCHARGE

- **ALLERGIC:**
  - Often bilateral palpebral injection of conjunctiva
  - FOLLICULAR COBBLESTONING OF INNER SURFACE OF LIDS
  - Seasonal
  - ITCHING
  - Antihistamines



COBBLESTONED APPEARANCE OF INNER LID

- **VIRAL:**
  - Very contagious
  - Crusts on awakening, FB sensation and tearing
  - Decrease irritation with artificial tears
  - Topical NSAIDS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