



Ocular Emergencies and Red Eye

429 Ophthalmology Team (female)

Sources:

- Dr. AlMuammar's lecture
- Toronto notes
- All pictures from the original lecture are included

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Ocular emergencies

* Team notes
are written
using this color.

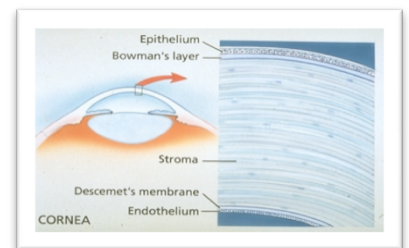
Ocular emergencies in general require urgent consultation to an ophthalmologist for management

Ocular emergencies:

- Corneal abrasion
- Corneal ulcer
- Chemical injury
- Uveitis
- Acute angle closure glaucoma
- Preseptal cellulitis and Orbital cellulitis
- Endophthalmitis
- Retinal detachment
- Orbital/Ocular trauma
 - Corneal and conjunctival foreign bodies
 - Hyphema
 - Ruptured globe
 - Orbital wall fracture
 - Lid Laceration

Top emergencies:

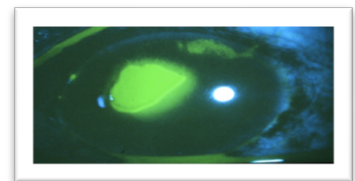
- 1-chemical injury
- 2-endophthalmitis
- 3-ruptured globe



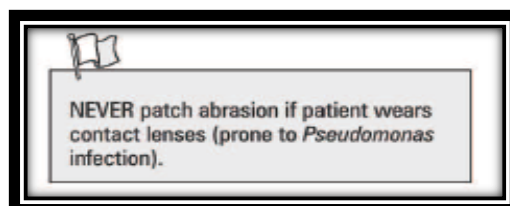
Normal anatomy of the cornea

Corneal abrasion:

- Cornea: the transparent layer forming the front of the eye
- Abrasion: the process of scraping or wearing the eye
- Corneal abrasion: epithelial defect usually due to trauma e.g. scratching/scraping
- With corneal abrasion there is usually a history of scratching the eye, itching the eye aggressively
- Symptoms: Foreign body sensation, Pain, Tearing, Photophobia, redness



- Treatment: Topical antibiotic, consider topical NSAID, cycloplegic, Pressure patch over the eye, and Refer to ophthalmologist. Most abrasions clear spontaneously with 24-48 hrs.
- Complications: infection, ulceration, recurrent erosions, secondary iritis



Corneal ulcer:

- Local necrosis of corneal tissue due to infection
- Corneal ulcers occur secondary to lid and conjunctival inflammation but are often due to trauma or contact lens wear
- Corneal ulcers may be bacterial, viral, fungal or parasitic (bacterial is the most common. Viral and fungal are rare and will take more time to manifest.)
- Ocular pain, redness, tearing and discharge (purulent discharge with bacterial and watery with viral), photophobia, foreign body sensation, with decrease vision and white lesion on the cornea are the common symptoms
- Prompt diagnosis of the etiology by doing corneal scraping is very important (for example, a bacterial corneal ulcer may cause perforation of the cornea in only a couple of hours -specially with gram negatives such as pseudomonas- so it is very vital to diagnose and treat the patient as soon as possible)
- Treatment with appropriate antimicrobial therapy is essential to minimize visual loss.
 - Start with empirical antibiotic therapy, and then after the diagnosis is achieved via culture, adjust treatment accordingly.
 - 1st generation cephalosporin are usually used to cover the gram positives, while 3rd generation cephalosporin are used to cover the gram negatives.
 - The antibiotics are given every hour for 24 hours. It is very important to follow this treatment plan because the cornea is avascular, so it is not possible to depend on the patient's immunity to help treat the ulcer. The patient is completely dependent on the antibiotic therapy.
- Complications: decreased vision, corneal perforation. Iritis, endophthalmitis

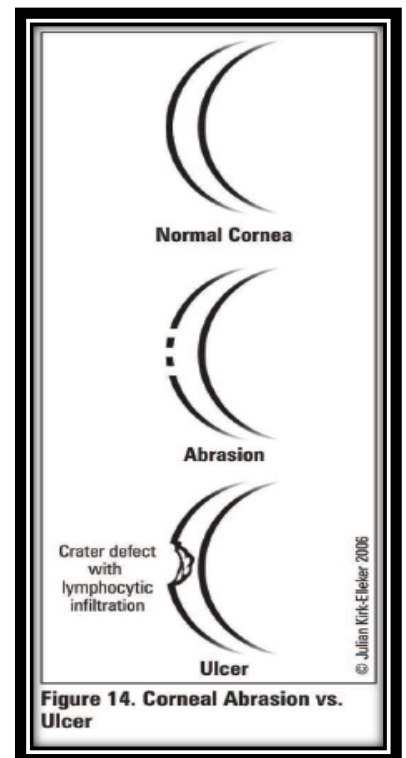
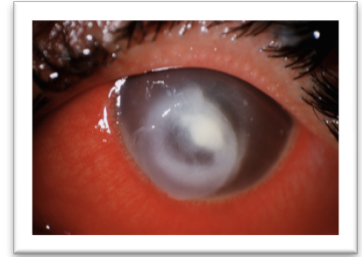


Figure 14. Corneal Abrasion vs. Ulcer

Contact lens users:

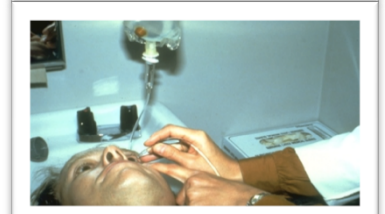
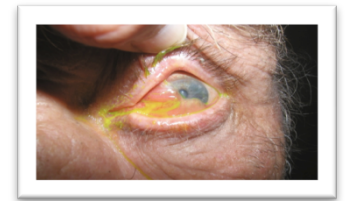
- Any redness occurring in patients who wear contact lenses should be managed with extreme caution
- Remove lens
- Rule out corneal infection
- Give antibiotics for gram negative organisms
- Do not patch
- Follow up with ophthalmologist in 24 hours

Table 5. Corneal Abrasion vs. Corneal Ulcer

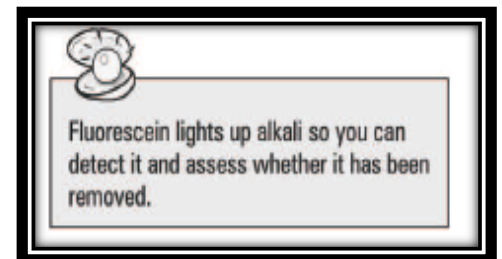
	Abrasion	Ulcer
Time Course	Acute (instantaneous)	Subacute (days)
History of Trauma	Yes	Not usually
Cornea	Clear	White, necrotic area
Iris Detail	Clear	Obscured
Corneal Thickness	Normal	May have crater defect/thinning
Extent of Lesion	Limited to epithelium	Extension into stroma

Chemical injuries:

- A vision-threatening emergency
- The offending chemical may be in the form of solid, liquid, powder, mist, or vapor. (Acidic/alkaline, alkaline is worse)
- Can occur in homes, most commonly from detergents, disinfectants, solvents, cosmetics, drain cleaners...
- Can range in severity from mild irritation to complete destruction of the ocular surface.
- Management: (goal: maintain normal neutral ocular PH)
 - Instill topical anesthetic
 - Check for and remove foreign bodies
 - Immediate irrigation essential, preferably with saline or Ringer's lactate solution, for at least 30 minutes
 - Irrigation should be continued until neutral pH is reached (i.e., 7.0)
 - Instill topical antibiotic
 - Frequent lubrications
 - Oral pain medication
 - Refer promptly to ophthalmologist



Irrigation in chemical injuries

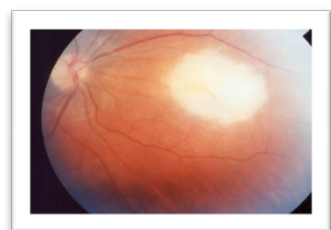
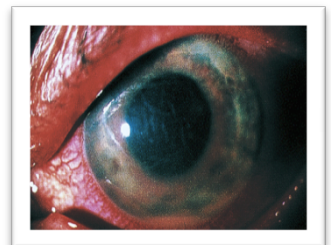


Uveitis: (this is uveitis in general, for more details check Toronto notes)

- The uveal tract (from anterior to posterior): iris, ciliary body, choroid
- Inflammation of the uveal tissue (iris, ciliary body, or choroid), retina, blood vessels, optic disc, and vitreous can be involved.

(Generally, is it a severe type of inflammation causing an immune reaction. Symptom: photophobia. Sign: Hypopyon can be seen-white cells- and is treated mainly with steroids)

- Etiology:
 - Idiopathic
 - Inflammatory diseases: HLA B27, Ankylosing spondylitis, IBD, Reiter's syndrome, Psoriatic arthritis, sarcoidosis, Behcet's, Vogt-Koyanagi-Harada Syndrome
 - Infectious: Toxoplasmosis, Tuberculosis, Syphilis
- Management:
 - Identify possible cause
 - Topical steroid
 - Topical cycloplegic (relaxation of muscles and dilatation of the pupil to push the pupil and iris away from the lens and prevent adhesion)

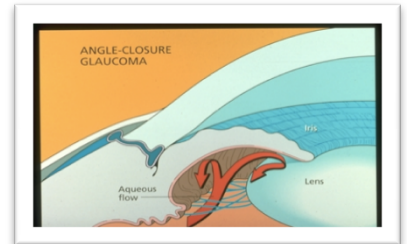


Toxoplasmosis (patch on retina)

- Systemic immunosuppressive medication: Steroid, Cyclosporine, Methotrexate, Azathioprine, Cyclophosphamide
- Immunomodulating agents: Infliximab

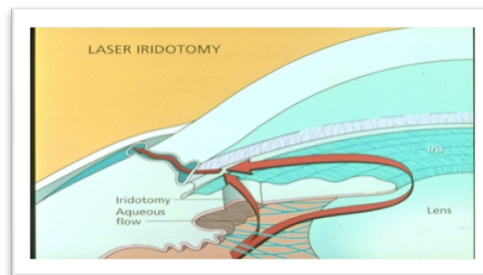
Acute angle closure glaucoma:

- Results from peripheral iris blocking the outflow of fluid
- Present with pain, redness, mid-dilated pupil with decrease vision and colored haloes around lights
- Severe headache or nausea and vomiting
- Intraocular pressure is elevated
- Can cause severe visual loss due to optic nerve damage
- Medical treatment and peripheral laser iridotomy will be curative in most cases



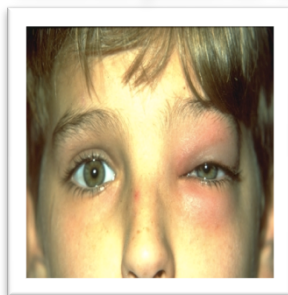
Peripheral Laser iridotomy in acute angle closure glaucoma:

- Done usually at 11, 12, and 1 o'clock of the iris
- Because the opening is covered and protected by the eye lid so light is prevented from entering through the opening

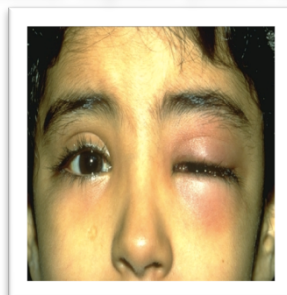


Preseptal cellulitis and Orbital cellulitis:

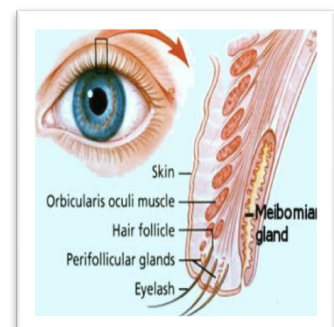
Preseptal cellulitis: infection of the soft tissue anterior to orbital septum while orbital cellulitis is inflammation of the orbital contents posterior to orbital septum (more deep)



Preseptal cellulitis



Orbital cellulitis



Normal anatomy of the eyelid

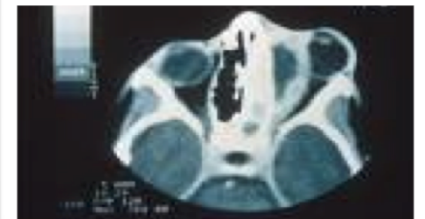
Preseptal cellulitis:

- Etiology (usually follows periorbital trauma or dermal infection)
 - Puncture wound, Laceration, Retained foreign body from trauma
 - Vascular extension, or extension from sinuses or another infectious site (e.g., dacryocystitis, chalazion)
 - Organisms: Staph aureus – Streptococci- H.influenzae
- Symptoms: Tender, swollen and erythematous lids. +/- Low grade fever
- Visual acuity, motility, pupils, and globe are normal
- May lead to orbital cellulitis
- Management:
 - Warm compresses
 - Systemic antibiotics e.g. Amoxicillin –clavulanic acid
 - CT sinuses and orbit if no improvement occurs or positive history of trauma (if severe or children < 1yr in age: treat as orbital cellulitis)

Orbital cellulitis:

- OCULAR and MEDICAL emergency
- Common in children, elderly and the immunocompromised
- Etiology: usually secondary to sinus, facial, tooth infection or trauma
- Symptoms: pain with or without eye movement, Decreased vision (VA), red eye, Impaired ocular motility/double vision, Afferent pupillary defect, Conjunctival chemosis and injection, Proptosis, Optic nerve swelling
- Management:
 - Admission
 - Blood cultures 2x and Nasopharynx cultures
 - Orbital CT
 - Intravenous antibiotics e.g. ceftriaxon + vancomycin for 1 week
 - Surgery may be necessary e.g. surgical drainage of abscess
 - Complications: optic nerve inflammation, cavernous sinus thrombosis, meningitis, and brain abscess with possible loss of vision and death

Orbital cellulitis is life-threatening if untreated (mortality of 17-20% without antibiotic use). Prompt diagnosis and treatment is essential.



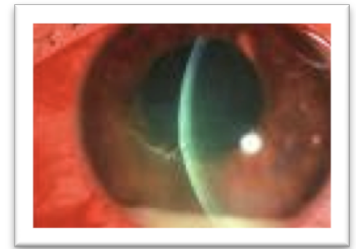
CT scan showing a subperiosteal abscess associated with orbital cellulitis

Table 4. Differentiating Between Preseptal and Orbital Cellulitis

Finding	Preseptal Cellulitis	Orbital Cellulitis
Fever	May be present	Present
Lid edema	Moderate to severe	Severe
Chemosis	Absent or mild	Marked
Proptosis	Absent	Present
Pain on eye movement	Absent	Present
Ocular mobility	Normal	Decreased
Vision	Normal	Diminished ± diplopia
RAPD	Absent	May be seen
Leukocytosis	Moderate	Marked
ESR	Normal or elevated	Elevated
Additional findings	Skin infection	Sinusitis, dental abscess

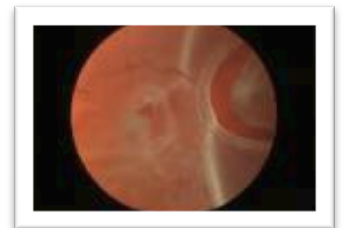
Endophthalmitis:

- **Intraocular infection**
- Potentially devastating complication of any intraocular surgery
- Any patient in the early postoperative period (within 6 weeks of surgery) c/o pain or decrease vision should be evaluated immediately
- May be due to penetrating injury to the eye, endogenous spread or Intravitreal injections
- Usually bacterial, may be fungal
- Symptoms: Very painful red eye, photophobia and discharge. Lid edema, Proptosis, corneal edema, and severely reduced VA. Anterior chamber cells/flare, hypopyon, reduced red reflex.
- Management
 - Vitreous sample for culture
 - Intravitreal antibiotics injection plus topical antibiotics (just like the cornea in corneal ulcers, the vitreous contains no blood vessels -> no immunity -> patient depends on antibiotics. It is very vital to treat the pt promptly)
 - Late stages, vitrectomy



Retinal detachment:

- Separation within the retinal layers (the neurosensory retina and the retinal pigment epithelium)
- Three types: rhegmatogenous-most common, tractional, exudative (more reading check Toronto notes)
- Symptoms
 - Sudden onset
 - Flashes, floaters, a curtain or shadow moving over the field of vision
 - Peripheral and/ or central visual loss (if macula is affected)
 - Decreased IOP
 - Ophthalmoscopy: detached retina is grey-white with surface blood vessels, loss of red reflex
 - Complications: recurrent retinal detachment, vitreous hemorrhage, loss of vision.



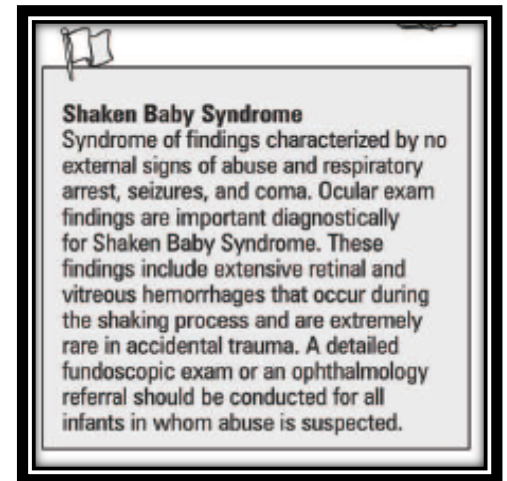
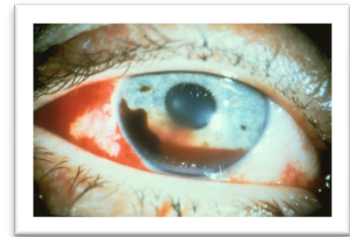
Treatment

- prophylactic: symptomatic tear (flashes or floaters) can be sealed off with laser/cryotherapy, with the goal of preventing progression to detachment
- therapeutic
 - rhegmatogenous
 - ♦ scleral buckle procedure (see *Surgical Ophthalmology*, OP43)
 - ♦ pneumatic retinopexy (see *Surgical Ophthalmology*, OP43)
 - ♦ both above treatments are used in combination with localization of retinal tears/holes and subsequent treatment with diathermy, cryotherapy or laser to create adhesions between the RPE and the neurosensory retina
 - ♦ vitrectomy plus injection of silicone oil in cases of recurrent detachment
 - tractional
 - ♦ vitrectomy ± membrane removal/scleral buckling/injection of intraocular gas as necessary
 - exudative
 - ♦ treat underlying cause

Ocular/orbital trauma:

Hyphema:

- Blood in anterior chamber often due to damage to root of the iris
- Can occur with blunt or penetrating injury
- Can lead to high intraocular pressure and permanent staining of the cornea
- Detailed history (Sickle cell)
- Management
 - Bed rest (to prevent rebleeding)
 - Topical steroid
 - Topical cycloplegic
 - Antifibrinolysis agents (Tranexamic acid)
 - Surgical evacuation



Ruptured globe:

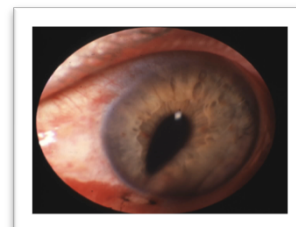
- Suspect a ruptured globe if:
 - Severe blunt trauma
 - Sharp object
- Suspect a ruptured globe if:
 - Bullous subconjunctival hemorrhage
 - Uveal prolapse (Iris or ciliary body)
 - Irregular pupil
 - Hyphema
 - Vitreous hemorrhage
 - Lens opacity
 - Lowered intraocular pressure
- If globe ruptured or laceration is suspected:
 - Stop examination
 - Shield the eye (close and suture the eye to prevent infection e.g. endophthalmitis)
 - Give tetanus prophylaxis
 - Refer immediately to ophthalmologist



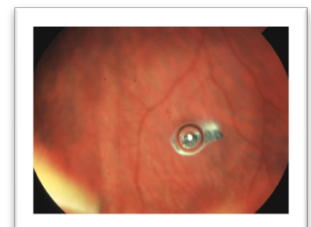
Bullous subconjunctival hemorrhage



Uveal prolapse (Iris/ciliary body)



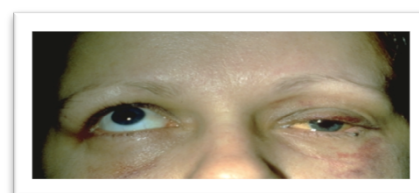
Irregular pupil



Intraocular foreign body

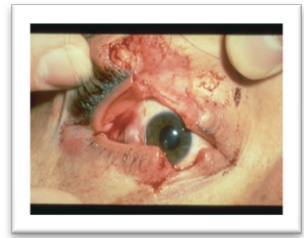
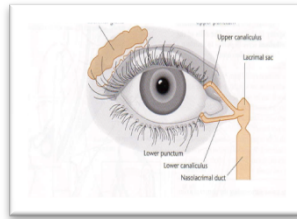
Orbital fractures:

- Assess ocular motility
- Assess sensation over cheek and lip
- Palpate for bony abnormality



Lid laceration:

- Can result from sharp or blunt trauma
- Rule out associated ocular injury



Red Eye

- Refers to hyperemia of the superficially visible vessels of the conjunctiva, episclera, or the sclera
- Caused by disorders of these structures themselves, or of adjacent structures like the eyelids, cornea, iris, and ciliary body
- Frequent presentation to GP
- Must be able to differentiate between serious vision threatening conditions and simple benign conditions

Differential diagnosis of red eye

- Conjunctival
 - Blepharoconjunctivitis
 - Bacterial conjunctivitis
 - Viral conjunctivitis
 - Chlamydial conjunctivitis
 - Allergic conjunctivitis
 - Toxic/chemical reaction
 - Dry eye
 - Pinguecula/pterygium
- Lid diseases
 - Chalazion
 - Sty
 - Abnormal lid function
- Corneal disease
 - Abrasion
 - Ulcer
- Foreign body
- Dacryoadenitis
- Dacryocystitis
- Masquerade syndrome
- Carotid and dural fistula
- Acute angle glaucoma
- Anterior uveitis
- Episcleritis/scleritis
- Subconjunctival hemorrhage
- Factitious



Is it conjunctivitis?

- History
 - Itching
 - Exposure to person with red eye
 - URTI
 - Past history of conjunctivitis
 - Discharge with morning crusting
 - Exposure to drugs
- Signs
 - Discharge
 - Lid and conjunctival edema
 - Conjunctival redness
 - Preauricular lymph node
 - Facial or eye lid vesicles

Table 1. Common Differential Diagnosis of Red Eye

	Conjunctivitis	Acute Iritis	Acute Angle-Closure Glaucoma	Keratitis
Discharge	Bacteria: purulent Virus: serous Allergy: mucous	No	No	Profuse tearing
Pain	No	++ (tender globe)	+++ (nauseating)	++ (on blinking)
Photophobia	No	+++	+	++
Blurred Vision	No	++	+++	Varies
Pupil	Normal	Smaller	Fixed in mid-dilation	Same or smaller
Injection	Conjunctiva with limbal pallor	Ciliary flush	Diffuse	Diffuse
Cornea	Normal or opacified	Keratic precipitates	Cloudy	Infiltrate, edema, epithelial defects
Intraocular pressure	Normal	Varies	Increased markedly	Normal or increased
Anterior chamber	Normal	Cells + flare	Shallow	Cells + flare or normal
Other	Large, tender pre-auricular node(s) if viral	Posterior synechiae	Coloured halos Nausea and vomiting	



Not every red eye has conjunctivitis.

Blepharitis:

- Adults > children
- Inflammation of the lid margin
- Two main types: staphylococcal-s.aureus (ulcerative, dry scales) and seborrheic (no ulcers, greasy scales)
- Symptoms: itching, tearing, foreign body sensation, thickened red lid margins with crusting, discharge with pressure on lids "toothpaste sign"
- Frequently associated with styes
- Meibomian gland dysfunction
- Warm compression, Lid hygiene, topical antibiotics, and lubricants are the mainstays of treatment
- Complications: recurrent chalazia, conjunctivitis, keratitis, corneal ulcerations and neovasclarizations.



Conjunctivitis:

- Infectious (viral, bacterial, Chlamydial, fungal, parasitic) or noninfectious (allergic, toxic, or secondary to another disorder)
- Symptoms: red eye, itching, foreign body sensation, tearing, discharge, crusting of lashes in the morning, lid edema, periauricular and or submandibular lymph nodes, follicles (pale lymphoid elevations of the conjunctiva), papillae (fibrovascular elevations of the conjunctiva with central network of finely branching vessels "cobblestone appearance")

Bacterial conjunctivitis:

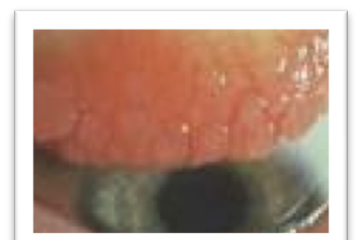
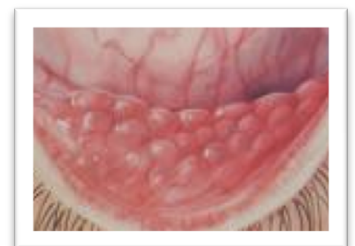
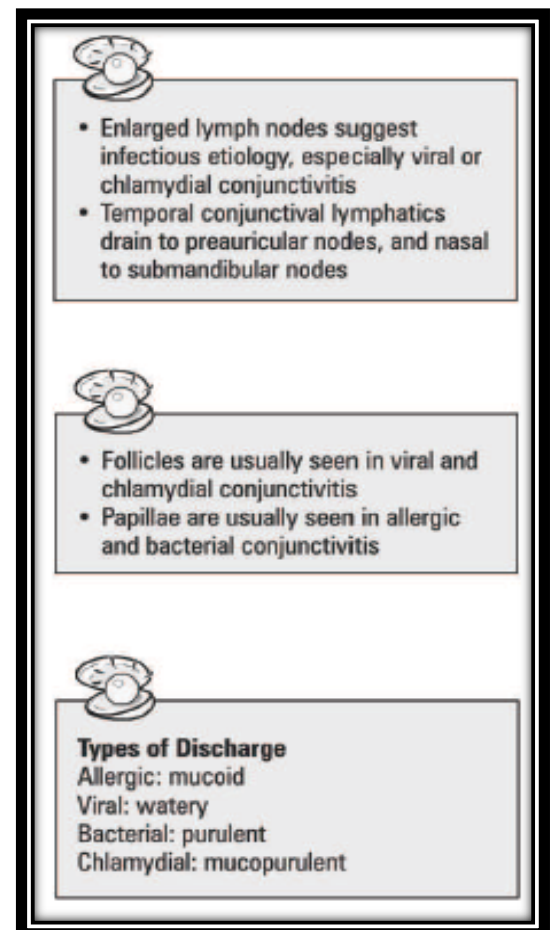
- Both adults and children
- Tearing, foreign body sensation, burning, stinging and photophobia
- Mucopurulent or purulent discharge
- Lid and conjunctiva maybe edematous
- Streptococcus pneumoniae, Haemophilus influenzae, and staphylococcus aureus and epidermidis
- Conjunctival swab for culture
- Topical broad spectrum antibiotics

Viral conjunctivitis:

- Acute, watery red eye with soreness, foreign body sensation and photophobia
- Conjunctiva is often intensely hyperemic and there maybe follicles, hemorrhages, inflammatory membranes and a pre-auricular node
- The most common cause is an adenoviral infection
- No specific therapy but cold compresses are helpful

Allergic conjunctivitis:

- Encompasses a spectrum of clinical condition
- All associated with the hallmark symptom of itching
- There is often a history of rhinitis, asthma and family history of atopy
- Signs may include mildly red eyes, watery discharge, chemosis, papillary hypertrophy and giant papillae
- Treatment consist of cold compresses, antihistamines, nonsteroidals, mast cells stabilizers, topical corticosteroids and cyclosporine



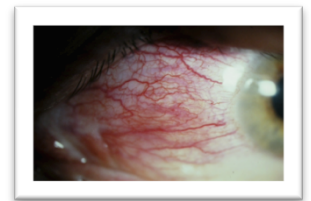
Chlamydial conjunctivitis:

- Usually occur in sexually active individuals with or without an associated genital infection
- Conjunctivitis usually unilateral with tearing, foreign body sensation, lid crusting, conjunctival discharge and follicles
- There is often non-tender preauricular node
- Treatments requires oral tetracycline or azithromycin

More details on conjunctivitis can be found in Toronto notes

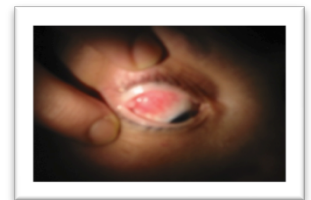
Episcleritis:

- Mostly idiopathic
- Can be localized (sectorial) or diffuse redness
- Often asymptomatic (may have discomfort, hot sensation, red eye, rarely painful)
- Blanches with topical phenylephrine
- Usually self limited, 2/3 of cases recurrent
- Treatment is topical or systemic NSAIDs (topical steroid for 3-5 days if painful)



Scleritis:

- 30 to 60 % may have an associated systemic diseases (RA)
- Pain which maybe severe with tenderness, tearing and photophobia, decreased vision (pain is the best indicator for disease progression)
- Maybe localized, diffuse or associated with nodules
- Can result in scleral necrosis (scleromalacia perforance)
- Failure to blanch with topical phenylephrine
- May need systemic NSAID or steroid (topical not useful)

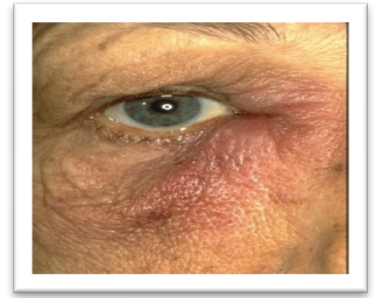


Dry eye:

- Symptoms
 - Burning or foreign body sensation
 - Tearing
 - Usually bilateral
- Etiology
 - Idiopathic
 - Collagen vascular diseases
 - Conjunctival scarring
 - Infiltration of the lacrimal gland
 - Vitamin A deficiency
- Treatment
 - Artificial tears

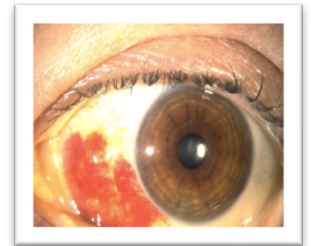
Nasolacrimal duct obstruction:

- Can lead to Dacryocystitis (acute or chronic infection of the lacrimal sac usually due to obstruction)
 - Pain, redness, and swelling over the innermost aspect of the lower eyelid, tearing, discharge
 - Organisms: Staphylococci, streptococci, and diphtheroids
 - Treatment: Systemic antibiotics, Surgical drainage



Subconjunctival hemorrhage:

- Usually asymptomatic
- Blood underneath the conjunctiva, often in a sector of the eye
- Etiology
 - Valsalva (coughing or straining)
 - Traumatic
 - Hypertension
 - Bleeding disorder
 - Idiopathic



Red eye treatment algorithm:

•History

- Trauma
- Contact lens wearer
- Severe pain/photophobia
- Significant vision changes
- History of prior ocular diseases

•Exam

- Abnormal pupil
- Ocular tenderness
- White corneal opacity
- Increased intraocular pressure

YES

Refer urgently to
ophthalmologist

DONE! From this point on, the Dr. just had the following pictures in the presentation without any explanation so the images shall be added including an explanation

Trichiasis

- eyelashes turned inwards
- may result from chronic inflammatory lid diseases (e.g. blepharitis), Stevens-Johnson syndrome, trauma, burns
- patient complains of red eye, foreign body sensation, tearing
- may result in corneal ulceration and scarring

Treatment

- topical lubrication, eyelash plucking, electrolysis, cryotherapy



Entropion

- lid margin turns in towards globe causing tearing, foreign body sensation, and red eye
- most commonly affects lower lid
- may cause abrasions with 2° corneal scarring

Etiology

- involutional (aging)
- cicatricial (herpes zoster, surgery, trauma, burns)
- orbicularis oculi muscle spasm
- congenital

Treatment

- lubricants, evert lid with tape, surgery

Ectropion

- lid margin turns outward from globe causing tearing and possibly exposure keratitis

Etiology

- involutional (aging)
- paralytic (CN VII palsy)
- cicatricial (burns, trauma, surgery)
- mechanical (lid edema, tumour, herniated fat)
- congenital

Treatment

- topical lubrication, surgery



Testing for Entropion

Forced lid closure: Ask patient to tighten lid then open. In entropion, lid rolls inwards.

Testing for Ectropion

Snapback test: Pull eyelid inferiorly. In ectropion, lid remains away from globe.



Pterygium

- fibrovascular triangular encroachment of epithelial tissue onto the cornea, usually nasal
- may induce astigmatism, decrease vision
- excision for chronic inflammation, threat to visual axis, cosmesis
- irritative symptoms may be treated with lubricating drops
- one-third recur after excision, lower recurrence with conjunctival autograft (5%)



Foreign Body

- foreign material in or on cornea
- may have associated rust ring if metallic
- patients may note tearing, photophobia, foreign body sensation, red eye
- signs include foreign body, conjunctival injection, epithelial defect that stains with fluorescein, corneal edema, anterior chamber cells/flare

Complications

- abrasion, infection, scarring, rust ring, 2° iritis

Treatment

- remove under magnification using local anesthetic and sterile needle or refer to ophthalmology (depending on depth and location)
- treat as per corneal abrasion



Foreign body behind lid may cause multiple vertical corneal epithelial abrasions due to blinking.



Topical analgesics should only be used to facilitate examination. They should NEVER be used as treatment for any ocular problem.

