



The Red Eye

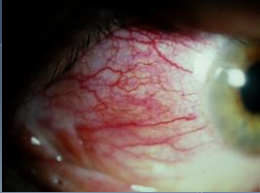
John Knapp, MD

Introduction

DIFFERENTIATE RED EYE DISORDERS

- Needs immediate treatment
- Needs treatment within a few days
- Does not require treatment



Introduction

SUBJECTIVE EYE COMPLAINTS

- Decreased vision
- Pain
- Redness

Characterize the complaint through history and exam.

Evaluation

RED EYE: POSSIBLE CAUSES

- Trauma
- Chemicals
- Infection
- Allergy
- Systemic conditions

Introduction

ETIOLOGIES OF RED EYE

- Chemical injury
- Angle-closure glaucoma
- Ocular foreign body
- Corneal abrasion
- Uveitis
- Conjunctivitis
- Ocular surface disease
- Subconjunctival hemorrhage

Evaluation

RED EYE: CAUSE AND EFFECT


Symptom	Cause
Itching	Allergy
Burning	Lid disorders, dry eye
Foreign body sensation	Foreign body, corneal abrasion
Localized lid tenderness	Hordeolum, chalazion

Evaluation

RED EYE: CAUSE AND EFFECT (Continued)

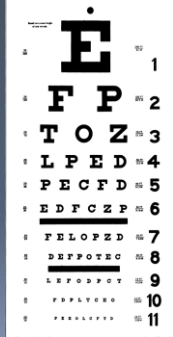
Symptom	Cause
Deep, intense pain	Corneal abrasions, scleritis, iritis, acute glaucoma, sinusitis, etc.
Photophobia	Corneal abrasions, iritis, acute glaucoma
Halo vision	Corneal edema (acute glaucoma, uveitis)

Evaluation




Equipment needed to evaluate red eye

Evaluation




Often don't need or can't get a refraction, but definitely obtain "pinhole" visual acuity.



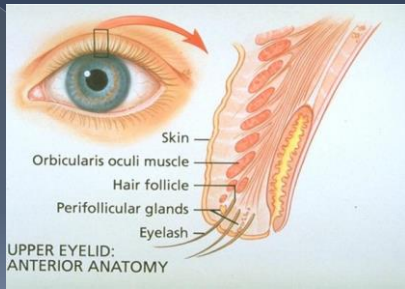
Evaluation

RED EYE DISORDERS: AN ANATOMIC APPROACH

- Face
- Adnexa
 - > Orbital area
 - > Lids
 - > Ocular movements
- Globe
 - > Conjunctiva, sclera
 - > Anterior chamber (using slit lamp if possible)
 - > Intraocular pressure (with tonu-pen is fine)




Disorders of the Ocular Adnexa



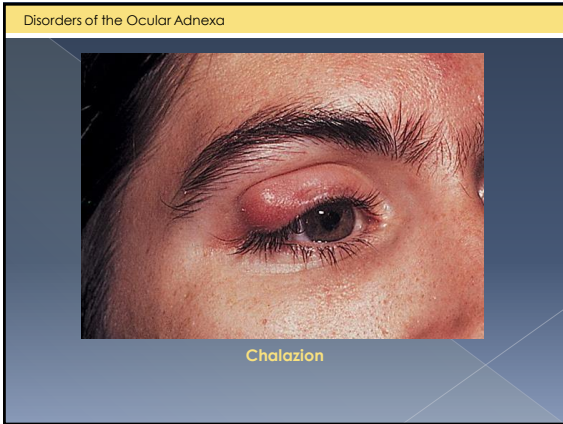
UPPER EYELID:
ANTERIOR ANATOMY

Meibomian Glands located in tarsal plate in upper and lower eyelids

Disorders of the Ocular Adnexa



Hordeolum



Disorders of the Ocular Adnexa

HORDEOLUM/CHALAZION: TREATMENT

- **Goal**
 - > To promote drainage
- **Treatment**
 - > Acute/subacute: Warm-hot compresses and eyelid massage (try to gently express the MG)
 - > Chronic: incision and curettage or steroid injection or can try topical gtt like Azasite or steroid gtt

Disorders of the Ocular Adnexa

BLEPHARITIS

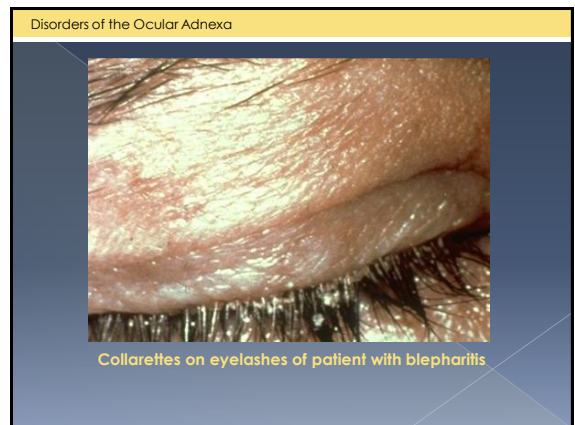
- AKA anterior blepharitis (lashes mostly)
- Inflammation of lid margin
- Associated with dry eyes
- Seborrhea causes dried skin and wax on base of lashes
- May have Staphylococcal infection
- Symptoms: lid burning, lash matting

Disorders of the Ocular Adnexa


Meibomian Gland Dysfunction

- Probably most common cause of chronic eye irritation
- Inadequate quantity and/or quality of meibomian gland secretions / oil
- Can also have inflammatory component, hence AKA posterior blepharitis

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Blepharitis and Meibomian Gland Dysfunction



These are very commonly seen together (anterior + posterior blepharitis) and treatment is similar and overlaps

How the Eye Works

Disorders of the Ocular Adnexa


Treatment



- Blepharitis
 - > Cleaning the eyelid margins (i.e. warm water with baby shampoo or commercial eyelid cleaner e.g. Ocusoft or Sterilid - <http://www.avevezone.com/encyclopedia/lidscrubs.html>)
 - > Antibiotic ointment or antibiotic & steroid combination
 - > Demodex blepharitis – TTO or Cliradex (4-Terpineol)
 - > Hypochlorous acid - NEW (Avenova or Ocusoft)
- Meibomian gland dysfunction
 - > Warm compresses 2-3 times daily and eyelid massage (new: Lipiflow - in-office thermal treatment)
 - > Omega-3 FA's
 - Diet: Fish, walnuts, etc
 - Supplement: Fish oil tablets
 - > Oral antibiotics in severe cases (ocular rosacea) i.e. Doxycycline
- Both
 - > Artificial tears, best choices are name-brand and preservative-free


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Disorders of the Ocular Adnexa



Preseptal cellulitis

Disorders of the Ocular Adnexa




Orbital cellulitis

Disorders of the Ocular Adnexa

ORBITAL CELLULITIS: SIGNS AND SYMPTOMS

- External signs: redness, swelling (same as preseptal cellulitis)
- How to distinguish from preseptal:
 - > Motility impaired, painful
 - > ± Proptosis
 - > Often fever and leukocytosis
 - > ± Optic nerve: decreased vision, afferent pupillary defect, disc edema



Disorders of the Ocular Adnexa

ORBITAL CELLULITIS: MANAGEMENT

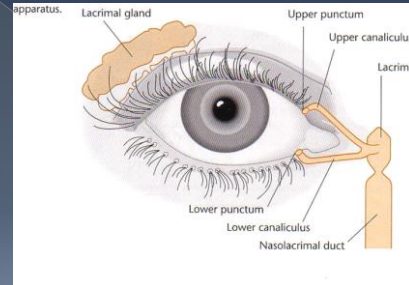
- ID consultation possibly
- Orbital CT scan (r/o subperiosteal abscess)
- CBC +/- Blood culture
- ENT consult if pre-existing sinus disease
- Hospitalization for IV abx (especially for kids), in select adult cases may manage as outpt under close supervision

Disorders of the Ocular Adnexa

ORBITAL CELLULITIS: TREATMENT

- IV antibiotics stat: Staphylococcus, Streptococcus, H. influenzae
- Surgical debridement if fungus, no improvement, or subperiosteal abscess
- Complications: cavernous sinus thrombosis, meningitis

Lacrimal System Disorders



Lacrimal system

Lacrimal System Disorders



Dacryocystitis

Lacrimal System Disorders

NASOLACRIMAL DUCT OBSTRUCTION: CONGENITAL

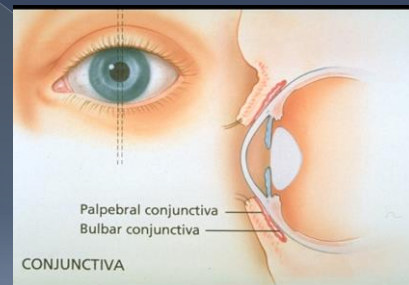
- Massage tear sac daily
- Probing, irrigation, if chronic
- Systemic antibiotics if infected

Lacrimal System Disorders

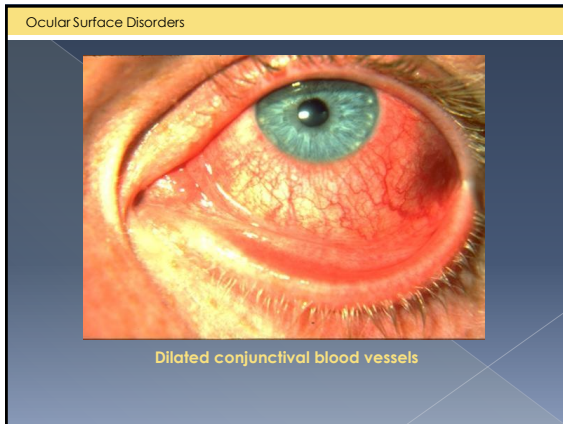
NASOLACRIMAL DUCT OBSTRUCTION: ACQUIRED

- Trauma a common cause
- Systemic antibiotics if infected
- Surgical procedure after one episode of dacryocystitis (dacryocystorhinostomy or DCR) prn

Ocular Surface Disorders



CONJUNCTIVA



Ocular Surface Disorders

ADULT CONJUNCTIVITIS: MAJOR CAUSES

- Viral
- Bacterial
- Allergic

Ocular Surface Disorders

CONJUNCTIVITIS: DISCHARGE

Discharge	Cause
Purulent	Bacterial
Clear	Viral*
Watery, with stringy; white mucus	Allergic**

* Preauricular lymphadenopathy signals viral infection
** Itching often accompanies

Ocular Surface Disorders

BACTERIAL CONJUNCTIVITIS: COMMON CAUSES


- *Staphylococcus* (skin)
- *Streptococcus* (respiratory)
- *Haemophilus* (respiratory)

Ocular Surface Disorders

BACTERIAL CONJUNCTIVITIS TREATMENT

- Topical antibiotic: qid x 7 days (aminoglycoside, erythromycin, fluoroquinolone, or trimethoprim-polymyxin)
- Artificial tears

Ocular Surface Disorders



Copious purulent discharge: Suspect *Neisseria gonorrhoeae*.

Ocular Surface Disorders



Viral conjunctivitis

Ocular Surface Disorders

VIRAL CONJUNCTIVITIS

- Watery discharge
- Highly contagious
- Palpable preauricular lymph node
- History of URI, sore throat, fever common



Ocular Surface Disorders



Allergic conjunctivitis

Ocular Surface Disorders

ALLERGIC CONJUNCTIVITIS

- Associated conditions: hay fever, asthma, eczema
- Contact allergy: chemicals, cosmetics, pollen
- Treatment: topical antihistamine drops, rarely need NSAID or steroid drops (Ketotifen great drop to start with)
- Systemic antihistamines may help

Ocular Surface Disorders

NEONATAL CONJUNCTIVITIS:
CAUSES

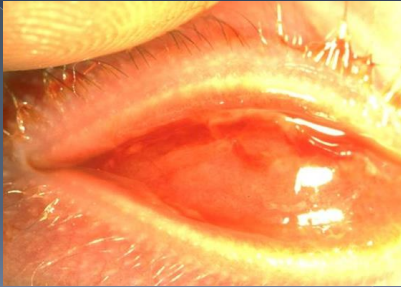
- Bacteria (*N. gonorrhoeae*, 2–4 days)
- Bacteria (*Staphylococcus*, *Streptococcus*, 3–5 days)
- Chlamydia (5–12 days)
- Viruses (eg, herpes, from mother)

Ocular Surface Disorders



Neonatal gonococcal conjunctivitis

Ocular Surface Disorders



Neonatal chlamydial conjunctivitis

Ocular Surface Disorders

NEONATAL CHLAMYDIAL
CONJUNCTIVITIS: TREATMENT

- Erythromycin ointment: qid x 4 weeks
- Erythromycin po x 2–3 weeks
40–50 mg/kg/day or even single dose of
po azithromycin may be effective

Ocular Surface Disorders



Subconjunctival hemorrhage

Ocular Surface Disorders

TEARS AND DRY EYES

- Tear functions:
 - Lubrication
 - Bacteriostatic and immunologic functions
- Dry eye (keratoconjunctivitis sicca) is a
tear deficiency state

Ocular Surface Disorders

TEAR DEFICIENCY STATES:
SYMPTOMS

- Burning
- Foreign-body sensation
- Paradoxical reflex tearing
- Symptoms can be made worse by
reading, computer use, television,
driving, lengthy air travel (decreased
blink rate...)


Ocular Surface Disorders

TEAR DEFICIENCY STATES:
ASSOCIATED CONDITIONS

- Aging
- Rheumatoid arthritis
- Stevens-Johnson syndrome
- Chemical injuries
- Ocular pemphigoid
- Systemic medications

Ocular Surface Disorders

Newer Dry Eye Diagnostics, examples- Tear Osmolarity and InflammDry (MMP-9), more on the way



Osmolarity Test Card **TearLab Osmolarity System**

Osmolarity Test Pen

InflammDry™ is the first and only, rapid, in-office test that detects MMP-9, an inflammatory marker that is consistently elevated in the tears of patients with dry eye disease. Using novel sensing microfluidic technology, InflammDry™ accurately identifies elevated levels of MMP-9 protein in tear fluid samples taken from the meibomian gland orifice of the lower eyelid, the potential reservoir.

InflammDry™ is a disposable, low cost test, that requires no additional equipment to administer or interpret results. Using four simple steps, InflammDry™ test results are achieved in just 10 minutes, making the diagnosis of dry eye before the patient leaves the office.

85% Sensitivity

94% Sensitivity


RPS

Ocular Surface Disorders

DRY EYES: TREATMENT

- Artificial tears
- Preservative-free artificial tears
- Lubricating ointment at bedtime
- Punctal occlusion
- Warm compresses to eyelids
- Counseling about activities that make dry eyes worse
- Cyclosporine drops (Restasis)
- Lifitegrast (Xiidra) - NEW

Ocular Surface Disorders



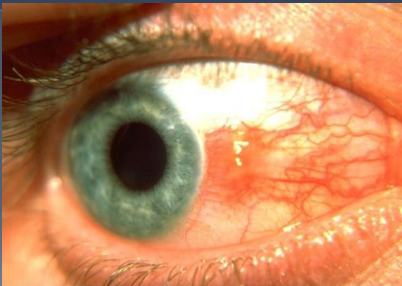
Thyroid exophthalmos: one cause of exposure keratitis

Ocular Surface Disorders

EXPOSURE KERATITIS: CAUSES AND MANAGEMENT


- Due to incomplete lid closure
- Manage with lubricating solutions/ointments
- Tape lids shut at night
- Careful about patching without taping – may cause a corneal abrasion

Ocular Surface Disorders



Pinguecula

Ocular Surface Disorders



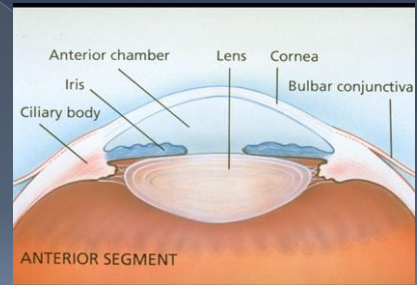
Pterygium

Ocular Surface Disorders

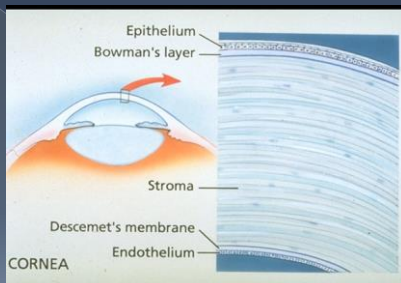
INFLAMED PINGUECULA AND PTERYGIUM: MANAGEMENT

- Artificial tears, something short course of topical steroids
- Counsel patients to avoid irritation
- If documented growth decreased vision may need surgery

Anterior Segment Disorders



Anterior Segment Disorders



Anterior Segment Disorders

ACUTE CORNEAL DISORDERS: SYMPTOMS

- Eye pain
 - > Foreign-body sensation
 - > Deep and boring
- Photophobia
- Blurred vision

Anterior Segment Disorders

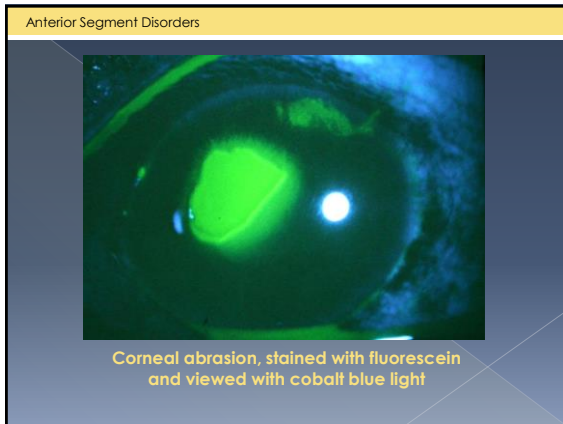


Irregular corneal light reflex and central corneal opacity

Anterior Segment Disorders



Fluorescein dye strip applied to the conjunctiva



Anterior Segment Disorders

CORNEAL ABRASION

- Signs and symptoms: redness, tearing, pain, photophobia, foreign-body sensation, blurred vision, small pupil
- Causes: injury, welder's arc, contact lens overwear

Anterior Segment Disorders

MANAGEMENT

- Goals:
 - > Promote rapid healing
 - > Relieve pain
 - > Prevent infections
- Treatment:
 - > 1% cyclopentolate (or another cycloplegic)
 - > Topical antibiotics
 - Drops polytrim, tobrex, fluoroquinolone, etc
 - Ointment erythromycin, bacitracin/polymyxin, etc
 - > ± Pressure patch or tape lids shut ok but not necessary in all cases
 - > Bandage contacts another option
 - > ± Oral analgesics, usually OTC options enough

Anterior Segment Disorders

Applying a pressure patch reasonable, my preference is eyelid taping

Anterior Segment Disorders

Foreign body

Remove with cotton tip, spud, needle tip, and/or use diamond burr for associated rust ring with metal FB

Anterior Segment Disorders

CHEMICAL INJURY

- A true ocular emergency
- Requires immediate irrigation with nearest source of water, can use Morgan Lens hooked up to normal saline or ringers lactate, may need 8-10 liters, pH should return to 7-7.4.
- Cederroth (sterile buffered isotonic sodium chloride) - buffer, even better than saline
- Management depends on offending agent

Anterior Segment Disorders



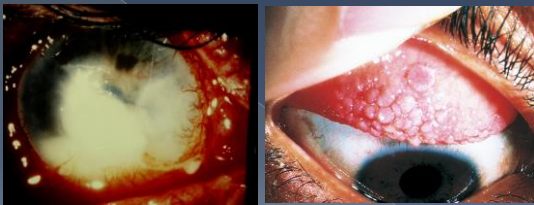
Chemical burn: acid – BAD!

Anterior Segment Disorders



Chemical burn: alkali – Worse!!!

Anterior Segment Disorders



Corneal ulcer

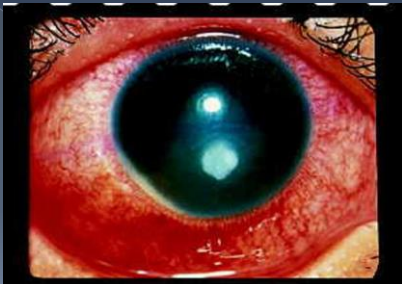
Giant papillary conjunctivitis

Anterior Segment Disorders

INFECTIOUS KERATITIS

- Frequently result from mechanical trauma (i.e. CL use, especially EW)
- Can cause permanent scarring and decreased vision
- Early detection, aggressive therapy are vital

Anterior Segment Disorders

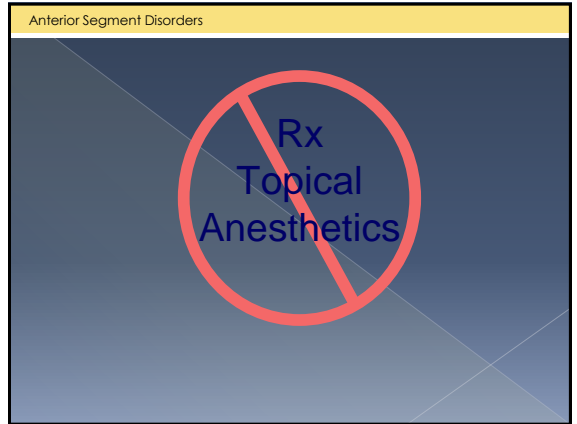
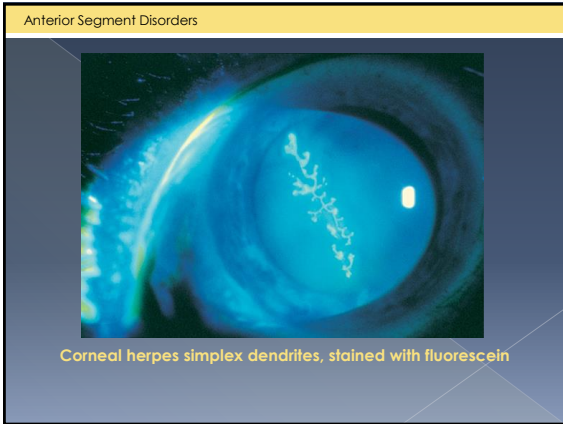


Bacterial infection of the cornea

Anterior Segment Disorders



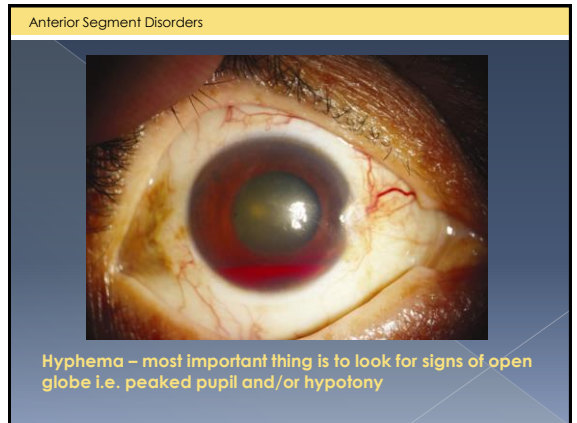
Primary herpes simplex infection



Anterior Segment Disorders

TOPICAL STEROIDS: SIDE EFFECTS
should only be prescribed by Ophthalmology

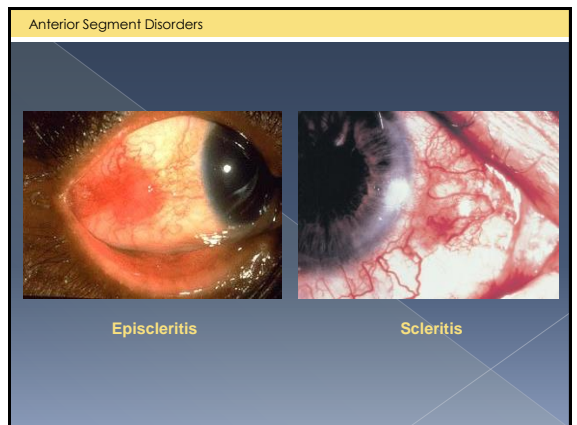
- Always ask and document who started patient on steroid therapy
- Facilitate corneal penetration of herpes virus
- Elevate IOP (steroid-induced glaucoma)
- Cataract formation and progression
- Potentiate fungal corneal ulcers



Anterior Segment Disorders

INFLAMMATORY CONDITIONS CAUSING A RED EYE:

- Episcleritis
- Scleritis
- Anterior uveitis (iritis)



Anterior Segment Disorders

IRITIS

Signs and Symptoms


- Circumlimbal redness
- Pain
- Photophobia
- Decreased vision
- Miotic pupil

Rule Out

- Systemic inflammation
- Trauma
- Autoimmune disease
- Systemic infection

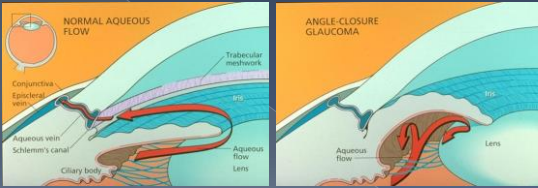
Anterior Segment Disorders

UVEITIS: SLIT LAMP FINDINGS



White cells in anterior chamber Hypopyon Keratic precipitates

Anterior Segment Disorders



NORMAL AQUEOUS FLOW

Conjunctiva, Epithelial vessels, Aqueous vein, Schlemm's canal, Ciliary body, Iris, Trabecular meshwork, Aqueous flow, Lens


ANGLE-CLOSURE GLAUCOMA

Aqueous flow, Lens


Anterior Segment Disorders

ACUTE GLAUCOMA: SIGNS AND SYMPTOMS

- Red eye
- Severe pain in, around eye
- Frontal headache
- Blurred vision, halos seen around lights
- Nausea, vomiting
- Pupil fixed, mid-dilated, slightly larger than contralateral side
- Elevated IOP (IF NOT ELEVATED IT IS NOT ACUTE ANGLE CLOSURE GLAUCOMA!!!)
- Corneal haze



Anterior Segment Disorders



Acute angle-closure glaucoma

Anterior Segment Disorders

ACUTE GLAUCOMA: INITIAL TREATMENT – Goal break attack

- Pilocarpine
- Timolol
- Brinzolamide or dorzolamide
- Apraclonidine or brimonidine
- Consider steroid drop and even prostaglandin analogue
- Acetazolamide 500 mg po or IV (not Sequel until IOP down)
- IV mannitol 20% 300–500 cc (or other osmotic, rarely used)
- Also: ocular massage, compression gonioscopy, and LPI, rarely may need Laser iridoplasty or even surgical PI

Summary

COMMON RED EYE DISORDERS:
TREATMENT INDICATED

- Hordeolum
- Chalazion
- Blepharitis
- Conjunctivitis
- Subconjunctival hemorrhage
- Dry eyes
- Corneal abrasions (most)

Summary

VISION-THREATENING RED EYE SIGNS
& SYMPTOMS: Telephone triage for
same day add-on in Eye clinic

- Decreased vision
- Severe ocular pain not relieved by topical proparacaine
- Severe photophobia
- Circumlimbal redness (this classic picture of "ciliary flush" in ACG is rarely seen though...)
- Severe corneal edema
- Corneal ulcers (> 2mm) / dendrites
- Abnormal pupil (assuming not chronic)
- Elevated IOP (nl IOP 10-22 mmHg... mild elevation i.e. high 20's is not that urgent vs IOP of 40 is a big deal)

Summary

VISION-THREATENING RED EYE
DISORDERS: URGENT EVALUATION

- Orbital cellulitis
- Scleritis (very painful, not relieved at all by proparacaine)
- Chemical injury (except very mild cases of course)
- Severe corneal infection (visible without slit lamp)
- Hyphema (need to r/o open globe)
- Iritis (decreased vision and severe photophobia)
- Acute glaucoma (significantly increased IOP)

Summary

THE RED EYE

- Questions?



Summary

Matthew and Alexander

