

Let's Take A Trip on the Red Eye

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Common Causes of Red Eyes

The collage includes: a close-up of a human eye with redness; a person wearing a blue surgical mask; a ginger cat; a pair of black-rimmed glasses; and a person covering their eyes with their hands. A red stamp with the word 'INFECTION' is overlaid on the bottom left of the collage.

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What this isn't

- Not a black eye (though it could result in one of the red eye conditions)
- Not a yellow eye (Jaundice)
- Pink eye: for sure! That is what everyone thinks they have!
- Not the Evil Eye (Mal d'Oro) although I have seen this before!

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What this is

- A systematic method of examining the eye/eyes of patients who complain of an eye problem that results in some form of redness
- Development of a list of differential diagnoses (DDX)
- Discerning the cause and next steps to treat these mild to vision-threatening conditions

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Goals of Assessment

- Red eye can be classified as sight-threatening or non-sight-threatening
- Those with painless red eye and normal vision have a very good prognosis
- When red eye is associated with pain, photophobia, watering and blurred vision, there is a higher risk of vision loss and must be addressed urgently
- Early and accurate diagnosis is critical.

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What do I need to do with this chief complaint?

- Obtain a thorough and detailed history
- Complete a careful examination of the eye and related structures
- Be aware that the chief complaint of "I have a red (or pink) eye" makes up 3-4% of all PCP and ED visits
- 50% of these are diagnosed as conjunctivitis, hordeolum or corneal abrasion
- It's the OTHER 50% that are the concern!

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HISTORY

- Onset* (sudden/gradual)
- Visual changes*
- Itch*
- Photophobia*
- Pain*
- Contact lens use*
- Discharge (clear or colored, watery, purulent, scant or copious)
- Headache
- Ophthalmologic history including eye surgery
- Bilateral or unilateral
- Trauma
- Prior history/FH
- Using any meds
- Comorbidities such as collagen vascular disease, HSV 1 or 2, gonorrhea, HTN, infection

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Eight Part Eye Exam

- **Visual acuity**
 - With present correction (if available)
 - Distance and/or near
 - Examine each eye individually and together
- Pupillary exam (PERRLA)
- Cornea, Iris, Sclera and Fundoscopic exam
- Ocular alignment and motility
- Visual field/Confrontation
- Tonometry (intraocular pressure) if available
- External eye and ocular adnexa (lids, ducts)
- Anterior chamber and anterior uvea/posterior segment if possible (penlight/slit lamp)

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Caveats

- Always ALWAYS do a visual acuity (VA) before referring a patient to an ophthalmologist or vision specialist...Just like you would do an EKG before calling a cardiologist!
- NPs SHOULD NOT PRESCRIBE STEROID EYE DROPS. If you think they are indicated, send to the ophthalmologist
- AVOID using garamycin eye drops. Use sulfa based, e-mycin, pcn (Polytrim), Cipro

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Tools of the Trade

- Snellen acuity chart (Tumbling E or Pediatric eye chart for children)
- Near acuity card (Rosenbaum pocket screener)
- Color vision plates
- Penlight or illuminator
- Ophthalmoscope
- Blue filter or Wood's lamp
- Tonopen if available
- Tetracaine or proparacaine
- Fluorescein drops or strips
- Small toy/pediatric fixation target

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Tools of the Trade



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Some Terms To Know

- Ciliary flush: redness is most apparent in a ring between the sclera and cornea. Found in uveitis, acute glaucoma. Different from redness from conjunctivitis
- Photophobia: Light sensitivity. Think conjunctivitis, uveitis, corneal inflammation
- Proptosis: forward displacement of the globe as in sinus disease
- Fixed pupil: uveitis presents with one pupil smaller than the other due to spasm of the iris musculature. AACG has a unilateral mid-dilated fixed pupil (irregular shape)
- Hyphema: Blood in the anterior chamber
- Increased IOP: normal IOP is 10-21mmHg. Think AACG or iridocyclitis
- Keratitis: Inflammation/infection of the cornea. May be infectious (bacterial/viral/fungal) or non-infectious in origin (chemical burns, dry eyes). Herpes keratitis (HSV or HZV) may be vision threatening

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Patient

- HPI: 22yo F college student with gradual onset of left red eye x 2d
- This morning her left eye was matted shut with yellow drainage
- Left eye feels gritty and she feels like rubbing it all the time
- Wears contacts, last exam 6mo ago
- Right eye without any symptoms



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Patient cont'd

- Denies eye or facial trauma, blurred vision, eye pain, N/V
- Has mild photophobia
- Elementary education major interning in a Kindergarten class
- NKDA
- Herpes simplex (-)
- STD (-)
- Meds: OCP
- PMH/PSH (-)

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What are your thoughts?

- Urgent vs nonurgent?
- Vision threatening or not?
- Any other items from her history that you need to make a diagnosis?
- What are your potential differential diagnoses?

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How can we classify conditions that we are seeing in the office?

- One of the most fruitful classifications relates to prognosis:
 - Vision-threatening disorders
 - Non-vision-threatening disorders
- Then we can quickly decide a plan of care, urgency, and referral

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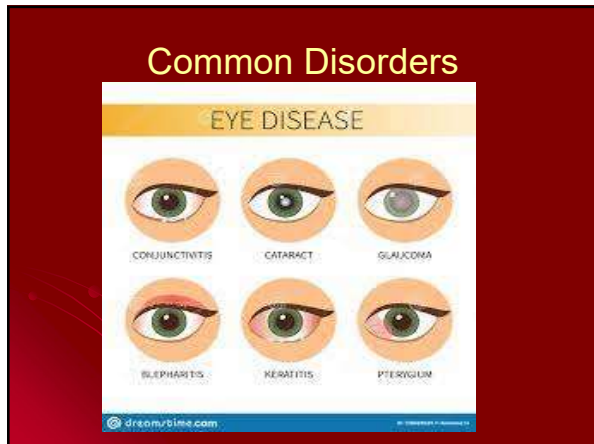


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RED EYE (VISION-THREATENING DISORDERS)

- Iritis/uveitis
- Corneal ulcers
- Angle-closure glaucoma
- Preseptal/orbital cellulitis
- Endophthalmitis
- Trauma
- Herpetic keratitis
- Chemical burn/UV light burn

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Back to our patient

- Nothing urgent:
- P=itchy, matted eye, some light sensitivity
- Q=Certainly bearable, no pain, more of an itch and eyelid feels puffy
- R=Localized to her left eye at present
- S=Bothersome, but not severe
- T= She just noticed it today when she awoke, but she was rubbing it last evening
- She recently got some new contact lens solution that had thimerisol as a preservative

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My 7 P's that raise suspicion for serious eye conditions

- Pain (severe)
- Pus/purulent material (eye, nose, sinuses)
- Puncture wound
- Previous (recent) eye surgery
- Punch to the face
- Pupillary changes/asymmetrical
- Poor vision or visual changes

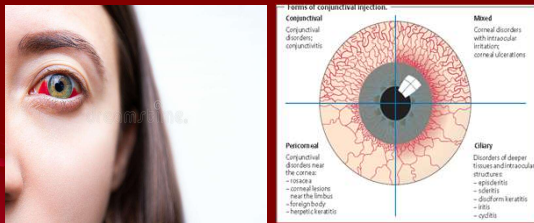
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Conjunctivitis

- | | |
|---|--|
| <ul style="list-style-type: none"> ● <u>Bacterial</u> ● Predominately itchy, gritty or burning ● Discolored D/C is present ● Mild photophobia ● ?Contact lens use ● Contacts with potential causes ● Injected appearance | <ul style="list-style-type: none"> ● <u>Allergic</u> ● Predominantly itchy ● Clear or no D/C ● Bilateral (usually) ● History of exposure to known allergens (cats, pollen) ● Injected appearance |
|---|--|

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Inspection Hemorrhage vs Injection



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So, what does our patient have?

- Allergic is a possibility due to her new contact lens solution
- Viral is a possibility, but she has no URI symptoms
- Bacterial is a strong choice, due to her exposure to young children, contact lens use, purulent and itchy d/c
- You diagnose her with bacterial conjunctivitis and prescribe her some eye drops and give her self care instructions

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Conjunctivitis Treatment and Pearls

- Most broad spectrum antibiotics will treat bacterial conjunctivitis
- Screen for allergies
- See what is available on her insurance plan or if she is self pay (Good Rx)
- Drops vs ointment (pros and cons of both)
- No wearing of contact lenses til treatment is finished. Throw out if possible
- Warm moist compresses tid
- Discard makeup. Good handwashing!
- She's persona non grata in school/work until well, usually 48 hours minimum

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Subconjunctival Hemorrhage

- Defined as blood that is trapped between the conjunctiva and the sclera. Many small blood vessels are present in the conjunctiva and they can rupture unexpectedly
- Painless
- No vision change
- May be related to sneezing, coughing forcefully, blood thinners, HTN, DM, ASCVD, trauma, surgery
- Benign condition usually

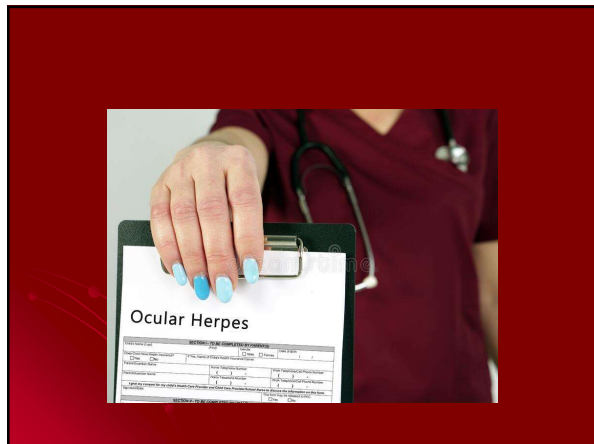


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Red Eye Diagnostic Algorithm

- The Edinburgh Red Eye Diagnostic Algorithm is one handy tool to help with making a diagnosis
- Accuracy is 72%, up to 76% for serious red eye cases
- <https://doi.org/101038/eye.2015.9>

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RED EYE: Viral infections

- Keratitis
 - viral

HSV-1 **H. zoster**

Two side-by-side images of eyes. The left image shows a blue-tinted eye with a dendritic ulcer, labeled "HSV-1". The right image shows a green-tinted eye with a central ulcer, labeled "H. zoster".

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Viral Keratitis

- Herpes keratitis can be HSV or HZV eye infections
- The viruses colonize on the trigeminal nerve, and may be recurrent
- Watery d/c, ciliary flush, decreased VA, characteristic dendritic ulcerations
- May be associated with generalized symptoms: fever, headache, malaise, burning sensation
- Treatment by ophthalmologist (Herpetic systemic and ocular meds, steroids)
- Refer ALL Herpetic facial lesions to an ophthalmologist before symptoms occur!

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UVEITIS



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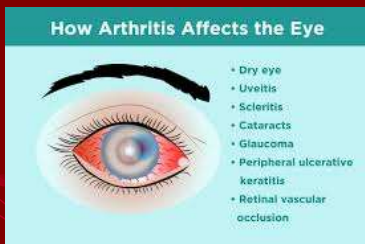
Uveitis

Uveitis is the third leading cause of preventable blindness in the developed world

- Characterized by pain and redness in the eye, photophobia, blurred vision, floaters in visual field, decreased vision, miosis, flare in anterior chamber
- Due to an inflammatory process with deposits in the blood vessels and structures of the anterior uveal tract
- Can occur in one or both eyes
- May be gradual or sudden with quick worsening of symptoms
- Emergent ophthalmology referral
- May need long term management

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Autoimmune Eye Disorders



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Uveitis and Autoimmune Disorders

- There is a correlation between uveitis and some autoimmune diseases
- No connection with uveitis and OA, but....
 - Lupus
 - Sarcoidosis
 - MS
 - IBD (UC and Crohn's)
 - Ankylosing spondylitis
 - RA
 - Psoriatic arthritis
 - Reactive arthritis (rare; triggered by an infection)
 - Behcet's disease (Triad of uveitis, mouth & genital lesions)

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Uveitis Treatment

- In older population it may be the result of SHINGLES or SARCOIDOSIS
- May occur with microbial infections such as syphilis, CMV, TB
- Treat the underlying cause
- Treatment of uveitis may be as simple as the use of steroid eye drops
- May also need immunosuppressive medications to prevent blindness

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Your Hot Button (Don't miss it!)



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Acute Angle Closure Glaucoma (AACG)

- Unilateral red eye
- Normal eyelid closure
- Injected eye, cornea is opaque
- Pupil of affected eye larger (mid-dilated)
- Pain (due to abrupt increased IOP >30mmHg)
- Nausea/vomiting are common symptoms
- Colored halos or rainbows around lights
- Due to the rapid and complete closure of the angle between the anterior chamber meshwork and the iris

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Remember this picture!



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Acute (Narrow) Angle-Closure Glaucoma

- | | |
|--|---|
| <input type="checkbox"/> Onset 50+ y.o. | <input type="checkbox"/> Mid-dilated, fixed pupil |
| <input type="checkbox"/> Severe eye pain | <input type="checkbox"/> "Glaukomflecken" |
| <input type="checkbox"/> Blurred vision | <input type="checkbox"/> Iris atrophy |
| <input type="checkbox"/> Red eye | <input type="checkbox"/> Severe anterior chamber inflammation |
| <input type="checkbox"/> Headache/nausea | |
| <input type="checkbox"/> Corneal edema
IOP>30mmHg | |

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AACG

- Refer to ophthalmology immediately
- Treatment is a prompt dose of acetazolamide (Diamox) and measurement of IOP until seen by specialist
- Ocular meds (drops) such as Timolol that reduce the production of aqueous humor and outflow via the trabecular network will be used
- Surgical intervention may be needed (iridectomy or lens removal)



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Ocular Trauma



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Ocular Trauma

- Blunt trauma (falls, punch to the face)
- Airbag injuries/burns
- Penetrating trauma (even small FBs)
- Traumatic retinal detachment
- Burns (contact): cigarette burns, hot curling iron
- Burns (chemical): alkali is much worse than acid, but both are dangerous

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SO WHAT DO I NEED TO DO???

Your job is to RECOGNIZE these conditions, not to treat them!
Exception is the chemical burn which needs immediate irrigation
All need to be seen by an ophthalmologist ASAP!
The E.D may not be the place to send them if they can see an ophthalmologist close by right away

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Treatment of Chemical Burns

- Start high volume saline irrigation
- Sweep the lids and corners for retained material
- Determine the type of chemical
- Check pH (goal is 7)
- Call ophthalmologist

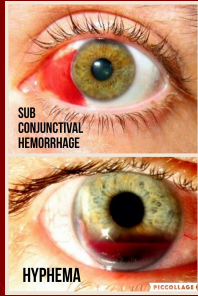
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Trauma

- Blunt trauma may result in blood in the anterior chamber of the eye, which presents as a HYPHEMA.
- Verify the mechanism of injury
- Direct blows to the face may result in blowout fractures or other injuries that are not initially obvious
- Most common FB is metal on metal (hammer and nail) releasing metal fragments that pierce the cornea, but can be eyelash imbedded, stick from mowing the lawn

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Hyphema vs subconjunctival hemorrhage: very different!



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Evaluation of Foreign Body

- Determine visual acuity (VA)
- Examine the globe integrity
- Do fundoscopic examination
- Stain eye if indicated (Seidel test)
- Place a shield over eye
- Call ophthalmologist
- Small FBs in the eye may be managed by an experienced provider in the office

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Seidel test: Use Fluorescein Strips



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Corneal Abrasions


- Corneal abrasions



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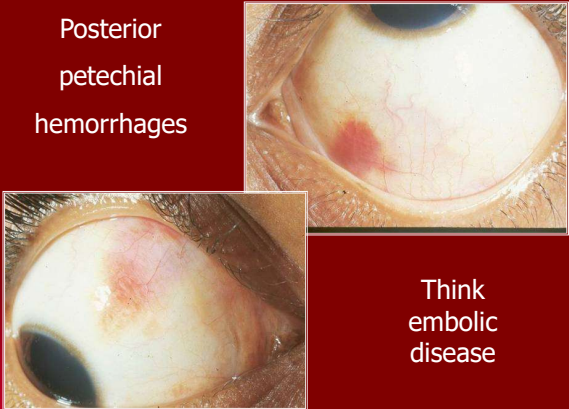
Corneal Ulcers

- Corneal ulcers
- **Extended Wear lens wearers**



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Posterior
petechial
hemorrhages



Think embolic disease

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Retinal Detachment

- Presents as a flash of light shortly before loss of vision
- May be "a veil" over the eye just after the flash
- Due to rods and cones stimulation as retina detaches
- Different from the scotoma of a migraine headache aura
- Scintillating flashes or a light spot or a blind spot in the migraine scotoma

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Endophthalmitis

- ❖ Severe pain
- ❖ Photophobia
- ❖ Poor vision
- ❖ Pus in the anterior chamber
- ❖ Recent intra-ocular surgery

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Orbital Cellulitis

- Results from unresolved ethmoid sinusitis (2/3 of all cases), orbital trauma, eye surgery
- S/S include lid swelling, pain, increased IOP, pain with EOMs
- Can result in optic nerve involvement, blindness, meningial infections, cavernous sinus thrombosis
- Needs CT imaging, hospitalization, IV antibiotics

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Orbital Cellulitis

A close-up photograph of a child's face. The right eye is significantly swollen and red, with a large, raised, reddish-purple area around it. The left eye appears normal. The child has light-colored hair and skin.

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Cellulitis: Orbital vs Preseptal

- Preseptal cellulitis tends to be a less severe disease than orbital cellulitis (postseptal cellulitis), which can present in a similar manner.
- **Orbital cellulitis** has a higher morbidity, requires aggressive treatment, and may require surgical intervention, whereas preseptal cellulitis usually is managed medically. Delineation of the exact location of inflammation is necessary for proper diagnosis and treatment. Usually begins as sinusitis or URI
- Primary organisms are S.aureus, S.epidermidis, Streptococcus and even anaerobes

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RED EYE (NON-VISION-THREATENING DISORDERS)

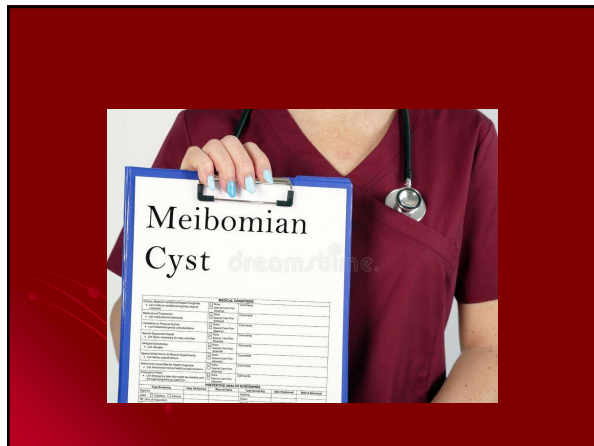
- Subconjunctival hemorrhage
- Conjunctivitis
- Blepharitis
- Keratitis*
- Dry eye
- Pterygium/pingueculum
- Hordeolum

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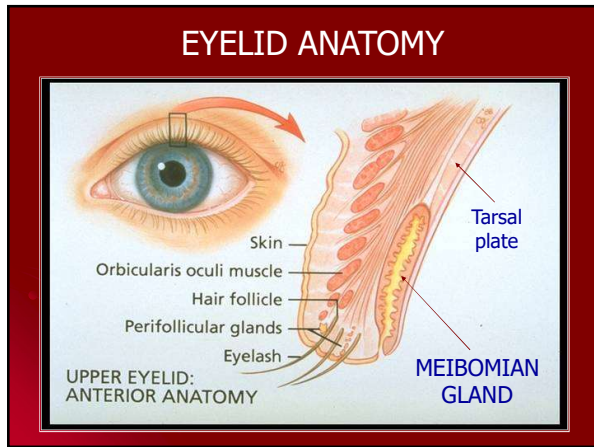
Some more eye terms to know

● Ectropion	● Iritis
● Entropion	● Glaucoma
● Blepharitis	● Mydratics
● Hordeolum	● Myopia
● Chalazion	● Hyperopia
● Amblyopia	● Presbyopia
● Conjunctivitis	● Keratitis
● Hyphema	● Scotoma

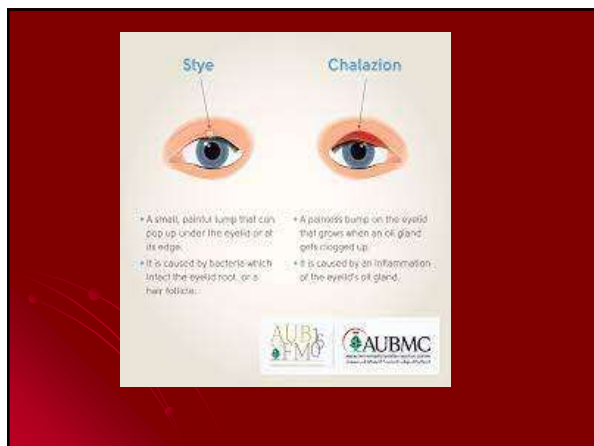
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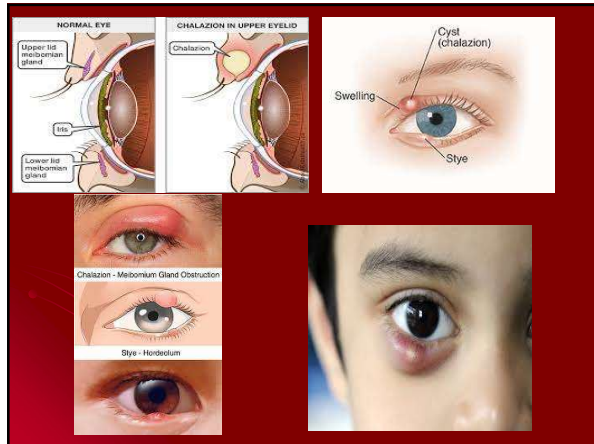
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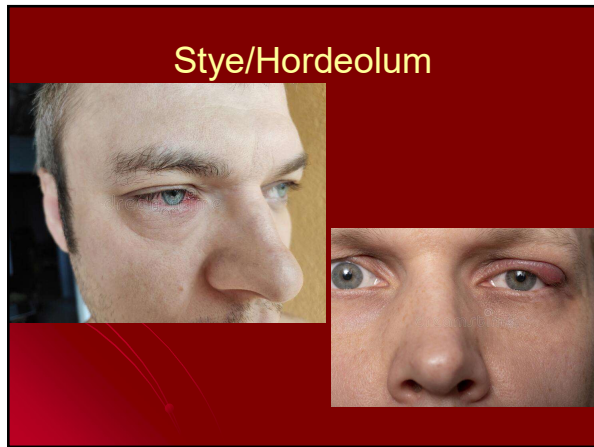
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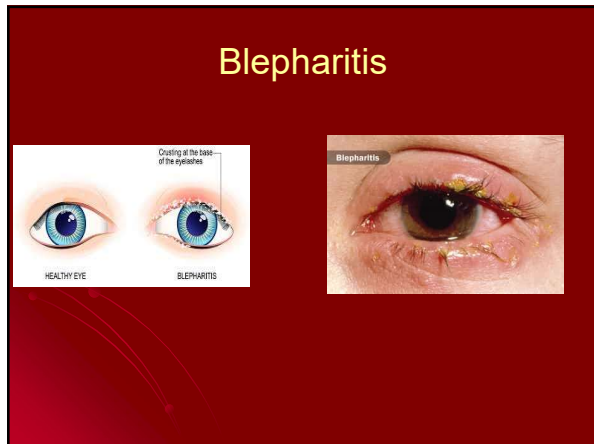


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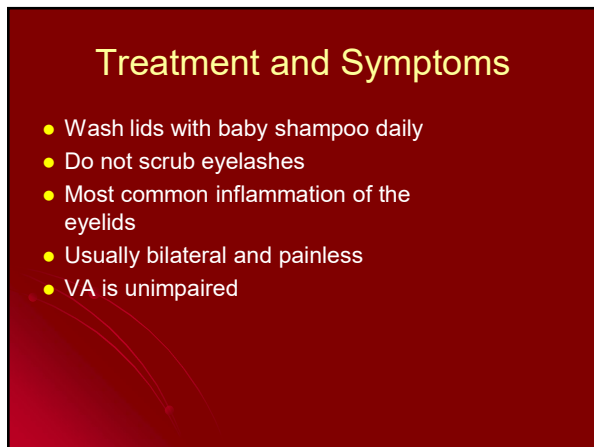
Hordeolum/Stye Treatment

- Warm moist compresses will soothe and help bring it to a head
- "Pimple" may rupture and purulent d/c will come out within 1-2 weeks
- Can use e-mycin ointment if needed
- NSAIDS for pain

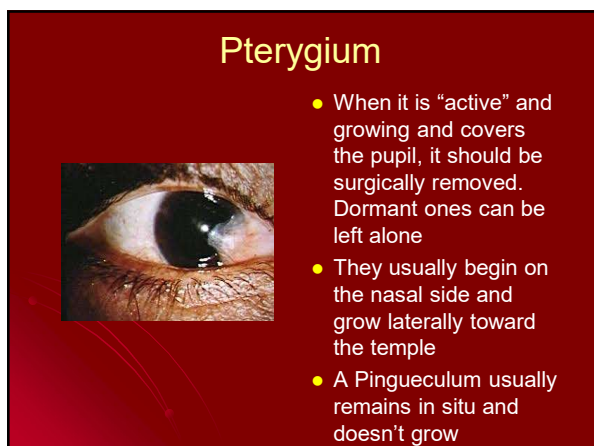
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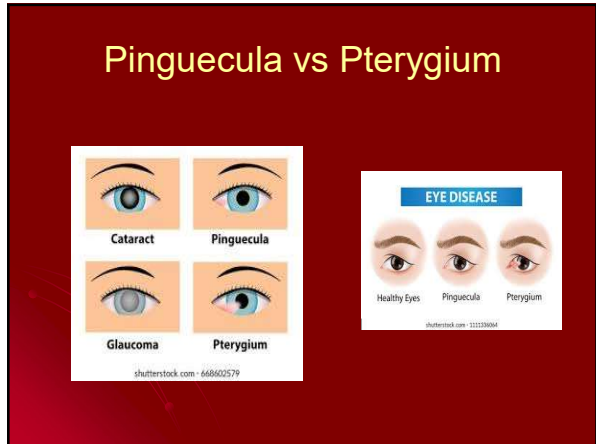
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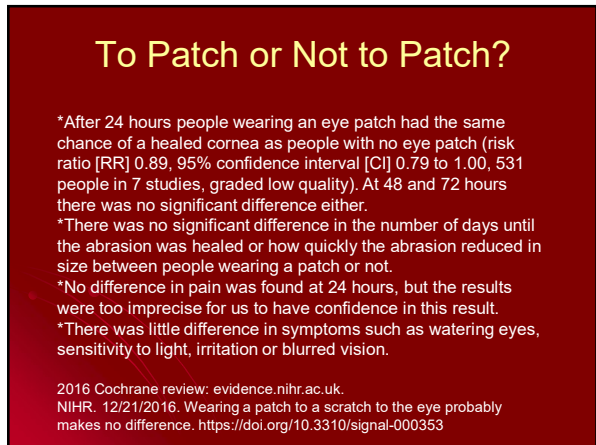
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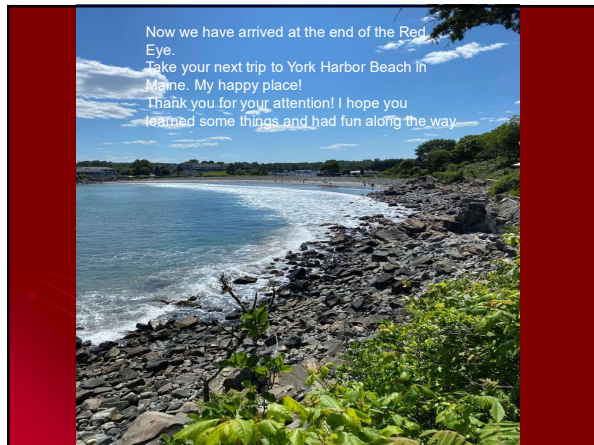
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