The Red Eye

John Knapp, MD

DIFFERENTIATE RED EYE DISORDERS
- Needs immediate treatment
- Needs treatment within a few days
- Does not require treatment

SUBJECTIVE EYE COMPLAINTS
- Decreased vision
- Pain
- Redness

DIFFERENTIATE RED EYE DISORDERS

Characterize the complaint through history and exam.

RED EYE: POSSIBLE CAUSES
- Trauma
- Chemicals
- Infection
- Allergy
- Systemic conditions

ETIOLOGIES OF RED EYE
1. Chemical injury
2. Angle-closure glaucoma
3. Ocular foreign body
4. Corneal abrasion
5. Uveitis
6. Conjunctivitis
7. Ocular surface disease
8. Subconjunctival hemorrhage

RED EYE: CAUSE AND EFFECT

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Itching</td>
<td>Allergy</td>
</tr>
<tr>
<td>Burning</td>
<td>Lid disorders, dry eye</td>
</tr>
<tr>
<td>Foreign body sensation</td>
<td>Foreign body, corneal abrasion</td>
</tr>
<tr>
<td>Localized lid tenderness</td>
<td>Hordeolum, chalazion</td>
</tr>
</tbody>
</table>
RED EYE: CAUSE AND EFFECT
(Continued)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Cause</th>
</tr>
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<tbody>
<tr>
<td>Deep, intense pain</td>
<td>Corneal abrasions, scleritis, iritis, acute glaucoma, sinusitis, etc.</td>
</tr>
<tr>
<td>Photophobia</td>
<td>Corneal abrasions, iritis, acute glaucoma</td>
</tr>
<tr>
<td>Halo vision</td>
<td>Corneal edema (acute glaucoma, uveitis)</td>
</tr>
</tbody>
</table>

Evaluation

Often don’t need or can’t get a refraction, but definitely obtain “pinhole” visual acuity.

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 tono-pen if fine)

Disorders of the Ocular Adnexa

Hordeolum

Disorders of the Ocular Adnexa

Meibomian Glands located in tarsal plate in upper and lower eyelids
Disorders of the Ocular Adnexa

**Chalazion**
A painless (usually, but acutely painful), slowly enlarging bump, usually chronic, formed by inflammation (not infection) of the meibomian glands.

**Hordeolum**
A localized infection or inflammation, usually acute, involving hair follicles of the eyelashes or meibomian glands.

### 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 gts

### 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 mattering

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

Collarettes on eyelashes of patient with blepharitis
Blepharitis and Meibomian Gland Dysfunction

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

Treatment

- **Blepharitis**
  - Cleaning the eyelid margins (i.e. warm water with baby shampoo or commercial eyelid cleaner e.g. Ocusoft or Sterilid)
  - Antibiotic ointment or antibiotic & steroid combination
  - Demodex blepharitis – TTO or Claridex (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

Disorders of the Ocular Adnexa

**Preseptal cellulitis**

- External signs: redness, swelling (same as preseptal cellulitis)

- How to distinguish from preseptal:
  - Mobility impaired, painful
  - +/- Proptosis
  - Often fever and leukocytosis
  - +/- Ophthalmic nerve decreased vision, dilated pupil

**Orbital cellulitis**

- 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

**Orbital Cellulitis: Signs and Symptoms**

- External signs: redness, swelling (same as preseptal cellulitis)
- How to distinguish from preseptal:
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  - +/- Proptosis
  - Often fever and leukocytosis
  - +/- Ophthalmic nerve decreased vision, dilated pupil

**Orbital Cellulitis: Management**

- ID consultation possibly
- Orbital CT scan (r/o subperiosteal abscess)
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**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**

**NASOLacrimal duct obstruction: CONGENITAL**
- Massage tear sac daily
- Probing, irrigation, if chronic
- Systemic antibiotics if infected

**NASOLacrimal duct obstruction: ACQUIRED**
- Trauma a common cause
- Systemic antibiotics if infected
- Surgical procedure after one episode of dacryocystitis (dacryocystorhinostomy or DCR) prn

**Lacrimal System Disorders**

**Ocular Surface Disorders**
ADULT CONJUNCTIVITIS: MAJOR CAUSES

- Viral
- Bacterial
- Allergic

CONJUNCTIVITIS: DISCHARGE

<table>
<thead>
<tr>
<th>Discharge</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purulent</td>
<td>Bacterial</td>
</tr>
<tr>
<td>Clear</td>
<td>Viral*</td>
</tr>
<tr>
<td>Watery, with stringy; white mucus</td>
<td>Allergic**</td>
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* Preauricular lymphadenopathy signals viral infection
** Itching often accompanies

BACTERIAL CONJUNCTIVITIS: COMMON CAUSES

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

BACTERIAL CONJUNCTIVITIS TREATMENT

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

Copious purulent discharge: Suspect Neisseria gonorrhoeae.
**VIRAL CONJUNCTIVITIS**
- Watery discharge
- Highly contagious
- Palpable preauricular lymph node
- History of URI, sore throat, fever common

**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

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

TEARS AND DRY EYES

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

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...)

TEAR DEFICIENCY STATES: ASSOCIATED CONDITIONS

- Aging
- Rheumatoid arthritis
- Stevens-Johnson syndrome
- Chemical injuries
- Ocular pemphigoid
- Systemic medications
Newer Dry Eye Diagnostics, examples - Tear Osmolarity and InflammaDry (MMP-9), more on the way.

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

**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

Ptérygium
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

ACUTE CORNEAL DISORDERS: SYMPTOMS

- Eye pain
  - Foreign-body sensation
  - Deep and boring
- Photophobia
- Blurred vision
Corneal abrasion, stained with fluorescein and viewed with cobalt blue light.

**CORNEAL ABRASION**

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

**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

Applying a pressure patch reasonable, my preference is eyelid taping.

**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

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

Chemical burn: acid – BAD!

Chemical burn: alkali – Worse!!!

Corneal ulcer  Giant papillary conjunctivitis

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

Bacterial infection of the cornea

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

INFLAMMATORY CONDITIONS CAUSING A RED EYE:

- Episcleritis
- Scleritis
- Anterior uveitis (iritis)

**Hyphema** – most important thing is to look for signs of open globe i.e. peaked pupil and/or hypotony
Anterior Segment Disorders

IRITIS

Signs and Symptoms
- Circumlimbal redness
- Pain
- Photophobia
- Decreased vision
- Miotic pupil

Rule Out
- Systemic inflammation
- Trauma
- Autoimmune disease
- Systemic infection

Rule Out
- Systemic inflammation
- Trauma
- Autoimmune disease
- Systemic infection

UVEITIS: SLIT LAMP FINDINGS
- White cells in anterior chamber
- Hypopyon
- Keratic precipitates

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

ACUTE GLAUCOMA: INITIAL TREATMENT – Goal break attack
- Pilocarpine
- Timolol
- Brimozolamide 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
COMMON RED EYE DISORDERS: TREATMENT INDICATED
- Hordeolum
- Chalazion
- Blepharitis
- Conjunctivitis
- Subconjunctival hemorrhage
- Dry eyes
- Corneal abrasions (most)

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 50 is a big deal)

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)

THE RED EYE
Questions?

Matthew and Alexander