EmergencyKT: Red Eye

Focused History:
- Blurry vision (improved with blinking?), Loss of vision or part of vision
- Pain, Photophobia, Drainage, History of Trauma,
- Contact Lens Wearer
- Constitutional Symptoms
- Previous Similar Symptoms

Focused Physical Exam:
- Visual Acuity
- General Appearance
- Visual Fields
- Pupillary Exam
- Extraocular Movements
- Fluorescein Exam/Slit Lamp
- Intraocular Pressure
- Fundoscopy

Exclusion Criteria
- Caustic Injury
- Globe Penetrating Trauma

Patient presents with appearance of redness

Identify appearance of redness as focal or diffuse

Focal
- “Tomato Ketchup” Appearance
- Sectoral Vascular Tortuosity
- Circumlimbal redness
- Pain?

Yes
- Episcleritis
- Nodular Scleritis

No/Mild
- Subconjunctival Hemorrhage

Diffuse
- Vascular Tortuosity
- “Tomato Ketchup” Appearance
- Fluorescein Staining
- Subconjunctival Hemorrhage

Normal?
Yes
- Drainage Present?

No
- Intraocular Pressure Normal?

No Elevated
- Glaucoma

Yes
- Conjunctivitis

Uptake Pattern
- Punctate
- Dendritic
- Geographical
- “Ice Rink”

Scleritis
- Keratitis
- Herpetic
- Ulceration
- Abrasion
Subconjunctival Hemorrhage

• Well-delineated area of redness due to the rupture of a small conjunctival vessel
• May have been preceded by coughing/sneezing/trauma
  • Can be seen in weight lifters
• Eye exam should, otherwise, be completely normal

✴ If bilateral or recurrent, should consider investigation of blood dyscrasias

Recommended Treatment

• Condition is self-limited and should resolve by 1-2 weeks

Recommended Follow-Up/Consultation

• Unless recurrent or bilateral, no follow-up or consultation is required.

Episcleritis

• Rapid onset of localized redness, characterized by radially-oriented, dilated episcleral vessels
• Sensation of dull ache
• May have associated tearing
• May be recurrent
• Should be NO:
  • Purulent discharge or decrease in visual acuity
  • Evidence of scleritis (focal or diffuse redness, bluish or pinkish discoloration of sclera, severe sharp pain, or decrease in vision)
• May be associated with systemic diseases
  • Inflammatory bowel disease, RA, SLE, atopy, psoriasis
• May be associated with ocular conditions
  • Ocular rosacea, keratoconjunctivitis sicca

Diagnosis/Description of Condition

Recommended Treatment

• Chilled saline eyedrops TID x 3 weeks
• Oral NSAIDs for control of discomfort

Recommended Follow-Up/Consultation

• Outpatient follow-up with ophthalmology within 1 week

**Scleritis**

**Diagnosis/Description of Condition**

- Progressive, subacute onset of either focal or diffuse redness
  - Often will be a bluish-violet hue to the sclera due to vascular congestion
  - Redness does not resolve with application of phenylephrine
- Significant aching pain and tenderness, usually minimal to no tearing, usually no impact on vision initially
- Pupillary responses preserved
- Inflammation of the deep episcleral plexus with edema of the sclera
- Up to 50% of cases are associated with autoimmune or connective tissue disorders (Wegener’s granulomatosis, Rheumatoid Arthritis, etc.)
- Vision threatening, risk of scleral perforation

**Recommended Treatment**

- Oral NSAIDs
- Topical steroids (i.e. Pref-Forte 1% 2 gtt s 4x daily)
- Oral steroids - usually reserved for severe cases or cases resistant to initial therapy

**Recommended Follow-Up/Consultation**

- Outpatient follow-up with ophthalmology within 24-48 hours


Acute Angle Closure Glaucoma

**Diagnosis/Description of Condition**

- Glaucoma is optic neuropathy with atrophy of the optic nerve head.
  - Angle-closure glaucoma is caused by narrowing of the anterior chamber angle. Aqueous humor cannot drain, pressure inside the eye rises, and damage occurs subsequently to the optic nerve.
- Patients often complain of severe pain, headache, decreased vision, and nausea
- Exam findings
  - Mid-dilated pupil, poorly responsive to light
  - Corneal edema/cloudiness
  - Elevated intraocular pressures (usually >40 mmHg)

**Recommended Treatment**

- Surgical management is only definitive treatment
- Medical Management
  - Timolol and Lantoprost
  - Additional agents as directed by ophthalmology

<table>
<thead>
<tr>
<th>Drug (Drug Class)</th>
<th>Dosing</th>
<th>Mechanism of Action</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timolol (β-blocker)</td>
<td>0.5% 1 gtt</td>
<td>Decreased aqueous production</td>
<td>Bronchoconstriction, bradycardia</td>
</tr>
<tr>
<td>Brimonidine (α-agonist)</td>
<td>0.15%-0.2% 1 gtt</td>
<td>Decreased aqueous production</td>
<td>Contact reaction</td>
</tr>
<tr>
<td>Pilocarpine (Muscarinic agonist)</td>
<td>2-4% solution 1 gtt</td>
<td>Increased tonographic outflow</td>
<td>Eye ache, cephalgia</td>
</tr>
<tr>
<td>Lantanoprost (Prostaglandin)</td>
<td>0.005% 1 gtt</td>
<td>Improves uveoscleral outflow</td>
<td>Discoloration of iris</td>
</tr>
<tr>
<td>Acetazolamide (Carbonic anhydrase inhibitor)</td>
<td>500 mg PO or IV</td>
<td>Decreased aqueous production</td>
<td>Malaise</td>
</tr>
<tr>
<td>Mannitol (Hyperosmotic)</td>
<td>1-2 g/kg over 45 min</td>
<td>Osmotic diuretic</td>
<td>Hypotension</td>
</tr>
</tbody>
</table>

**Recommended Follow-Up/Consultation**

- Emergent consultation with ophthalmology

Iritis/Uveitis

- **Anterior:**
  - **Definition:** anterior uvea = iris + ciliary body; inflammation of anterior uvea = anterior uveitis = iritis
  - **Exam:**
    - Red and painful eye, typically no foreign body sensation.
    - Ciliary Flush: injection around iris.
    - Consensual response: pain in affected eye with light in unaffected eye
  - **Diagnosis:**
    - Consensual Response + Slit-lamp exam “cells and flare”
    - *If topical anesthesia relieves pain (and no sign of corneal pathology) it probably is not this disease.*

- **Posterior:**
  - **Definition:** posterior uvea = choroid; inflammation of posterior uvea = vitritis, choroiditis, retinitis
  - **Exam:** typically painless, may have floaters or reduced visual acuity
  - **Diagnosis:** more difficult, requires scleral depression, or slit-lamp with special lenses
  - **Causes:**
    - Infections: e.g. syphilis, Herpes, TB, CMV, HIV, Toxoplasmosis
    - Immune-Mediated: e.g. Crohn’s/UC, JRA, Sarcoidosis
    - Trauma
    - *Detailed history is crucial in the non-trauma patient*

---

### Diagnosis/Description of Condition

<table>
<thead>
<tr>
<th>Diagnosis/Description of Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>- <strong>Anterior:</strong></td>
</tr>
<tr>
<td>- <strong>Definition:</strong> anterior uvea = iris + ciliary body; inflammation of anterior uvea = anterior uveitis = iritis</td>
</tr>
<tr>
<td>- <strong>Exam:</strong></td>
</tr>
<tr>
<td>- Red and painful eye, typically no foreign body sensation.</td>
</tr>
<tr>
<td>- Ciliary Flush: injection around iris.</td>
</tr>
<tr>
<td>- Consensual response: pain in affected eye with light in unaffected eye</td>
</tr>
<tr>
<td>- <strong>Diagnosis:</strong></td>
</tr>
<tr>
<td>- Consensual Response + Slit-lamp exam “cells and flare”</td>
</tr>
<tr>
<td>- <em>If topical anesthesia relieves pain (and no sign of corneal pathology) it probably is not this disease.</em></td>
</tr>
<tr>
<td>- <strong>Posterior:</strong></td>
</tr>
<tr>
<td>- <strong>Definition:</strong> posterior uvea = choroid; inflammation of posterior uvea = vitritis, choroiditis, retinitis</td>
</tr>
<tr>
<td>- <strong>Exam:</strong></td>
</tr>
<tr>
<td>- typically painless, may have floaters or reduced visual acuity</td>
</tr>
<tr>
<td>- <strong>Diagnosis:</strong></td>
</tr>
<tr>
<td>- more difficult, requires scleral depression, or slit-lamp with special lenses</td>
</tr>
<tr>
<td>- <strong>Causes:</strong></td>
</tr>
<tr>
<td>- Infections: e.g. syphilis, Herpes, TB, CMV, HIV, Toxoplasmosis</td>
</tr>
<tr>
<td>- Immune-Mediated: e.g. Crohn’s/UC, JRA, Sarcoidosis</td>
</tr>
<tr>
<td>- Trauma</td>
</tr>
<tr>
<td>- <em>Detailed history is crucial in the non-trauma patient</em></td>
</tr>
</tbody>
</table>

### Recommended Treatment

- **Consider workup for likely causes as well as treating symptoms**
- **Cycloplegia:** e.g. Cyclopentolate 1 to 2%: 1 drop three times a day for mild to moderate inflammation (lasts up to 2 days)
- **Topical Steroids:** Use in consultation with Ophthalmology. E.g. Prednisolone acetate 1%: 1 drop every 4 to 6 hour
- **Warm compresses, analgesia**

### Recommended Follow-Up/Consultation

- Follow up with Ophthalmology within 24 hours
- Referral to appropriate specialist for likely underlying cause
### Punctate Keratitis

- Non-specific punctate of fluorescein seen in a number of conditions
- Patients typically present with pain, photophobia, redness, and a foreign body sensation
- Pre-disposing conditions:
  - UV-exposure - tanning beds, welders
  - Topical eye medications
    - Can be seen with OTC eye gtts as well as prescription medication
  - Dry eyes
    - May see inspisation of Meibomian glands
  - Contact lens associated
    - Can be due to local trauma, overuse, reaction to preservative, or infectious
- Can be infectious in origin

### Diagnosis/Description of Condition

|---|

### Recommended Treatment

- Remove any identified causative agent (i.e. discontinue contact lens wear)
- Topical fluoroquinolone (Moxifloxacin 1% q2h or Ofloxacin 0.3% q2h)
- Preservative-free artificial tears

### Recommended Follow-Up/Consultation

- Follow-up with ophthalmology in 24 hours
Corneal Ulcer (Bacterial Keratitis)

- Patients present with pain, foreign body sensation, redness, may have decreased vision depending on location of ulcer
- Dense uptake of fluorescein in a geographic pattern
- Predisposing conditions
  - Contact lens wear
  - Corneal trauma
  - Corneal surface disease
- Organisms
  - Coagulase (-) Staph most common overall
  - Increased incidence of Gram (-) organisms, specifically Pseudomonas in contact lens wearers

### Diagnosis/Description of Condition

<table>
<thead>
<tr>
<th>Topical Antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monotherapy with fluoroquinolones - Moxifloxacin 1% q1h or Ofloxacin 0.3% q1h</td>
</tr>
<tr>
<td>Dual therapy with fortified tobramycin and cephazolin</td>
</tr>
<tr>
<td>Fortified tobramycin likely not commercially available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Organisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulase (-) Staph most common overall</td>
</tr>
<tr>
<td>Increased incidence of Gram (-) organisms, specifically Pseudomonas in contact lens wearers</td>
</tr>
</tbody>
</table>

### Recommended Treatment

- No evidence to support empiric treatment with corticosteroids

### Recommended Follow-Up/Consultation

- If in center with ophthalmology coverage, recommend consultation
- Early scrapings allow for culture and may increase antibiotic penetration
- If reliable patient and mild disease, may arrange follow-up with ophthalmology in 24 hours


### Herpetic Keratitis

#### Diagnosis/Description of Condition

- **Important to Differentiate between HSV keratitis and Herpes Zoster Ophthalmicus**
  - **HSV Keratitis**
    - Unilateral, often recurrent vesicular involving eyelids, conjunctiva, and cornea
    - Painful recurrences often precipitated by recent URI, fever
  - **HZV Ophthalmicus**
    - Recurrence of varicella virus affecting the V1 distribution of the trigeminal nerve
    - Vesicular rash involving forehead, nose, eyelids, conjunctiva, and cornea
    - Prodromal pain is common
    - Can cause extraocular muscle palsy or palsy of orbicularis oculi

#### Recommended Treatment

- **HSV Keratitis**
  - Topical antiviral (i.e. Acyclovir 3% ointment 5 times daily)
  - Topical interferon may lead to faster healing, may use if available or if recommended by consultant
    - 200,000 units of interferon/ml - 2 gtts 8 times daily
- **Zoster Ophthalmicus**
  - Oral antivirals (Acyclovir 800 mg PO 5 x daily, valacyclovir 1000 mg PO TID, or famciclovir 500 mg PO TID)
  - Bacitracin-Polymixin ophthalmic ointment BID
  - Appropriate treatment for iritis, glaucoma if present
  - Consider systemic steroids if severe pain or swelling
    - Prednisone 20mg TID x 2 days, BID x 6 days, daily x 4 days

#### Recommended Follow-Up/Consultation

- If in center with ophthalmology coverage, consultation recommended
- If mild disease and reliable follow up can be arranged, may follow up within 24 hours after initiation of appropriate therapy

---


Corneal Abrasions

- Pain, foreign body sensation, photophobia, decreased visual acuity (if abrasion is within visual axis)
  - Pain is relieved with the application of topical anesthetic
- Epithelial defect seen on fluorescein exam
  - Seidel's test to evaluate for perforation: place fluorescein directly on the abrasion to see if aqueous humor leaks from the anterior chamber
- Evaluation of the lid for foreign body
- Contact lens wearers should be treated as if they have bacterial keratitis

**Diagnosis/Description of Condition**

**Recommended Treatment**

- Topical Antibiotics (i.e. Erythromycin ophthalmic ointment, 1/2 in to conjunctiva QID x 7 days)
- Topical NSAIDs (i.e. Diclofenac ophthalmic, 1 gtt daily to QID PRN pain)
- Cycloplegia (i.e. Cyclopentolate 1-2 gtt)
  - Warn patient that mydriasis may continue for up to 24 hours
- Tetanus vaccination
  - No known cases of clinical tetanus from corneal abrasion
  - May consider for perforation or injuries containing dirt or organic matter
- Eye-patching is not recommended
- Topical anesthetics are not recommended

**Recommended Follow-Up/Consultation**

- If uncomplicated, may follow up electively with PMD or ophthalmology
- If contact lens wearer, follow up with ophthalmology within 24 hours or sooner if available

EmergencyKT: Conjunctivitis

Patient Diagnosed with Conjunctivitis

Identify Type of Drainage

Purulent

Bacterial Conjunctivitis

Watery (with or without Mucus)

Allergic Conjunctivitis

Yes

Significant itching?

No

Viral Conjunctivitis
Bacterial Conjunctivitis

- Inflammation of the bulbar and palpebral conjunctiva
- Redness and discharge in one or both eyes, with affected eye "stuck shut" in morning.
- Drainage is purulent compared to the watery/mucus discharge of viral or allergic conjunctivitis.
- Photophobia and visual loss should not be present.
- Neisseria conjunctivitis: Severe and sight threatening. Profuse purulent discharge, tender eye, eyelid swelling.
  - Look for concurrent urethritis.
- Contact Lens Wearers: Be aware of ulcerative keratitis, which can progress to ocular perforation in 24 hours if not treated appropriately.

Diagnosis/Description of Condition

<table>
<thead>
<tr>
<th>Diagnosis/Description of Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inflammation of the bulbar and palpebral conjunctiva</td>
</tr>
<tr>
<td>• Redness and discharge in one or both eyes, with affected eye &quot;stuck shut&quot; in morning.</td>
</tr>
<tr>
<td>• Drainage is purulent compared to the watery/mucus discharge of viral or allergic conjunctivitis.</td>
</tr>
<tr>
<td>• Photophobia and visual loss should not be present.</td>
</tr>
<tr>
<td>• Neisseria conjunctivitis: Severe and sight threatening. Profuse purulent discharge, tender eye, eyelid swelling.</td>
</tr>
<tr>
<td>• Look for concurrent urethritis.</td>
</tr>
<tr>
<td>• Contact Lens Wearers: Be aware of ulcerative keratitis, which can progress to ocular perforation in 24 hours if not treated appropriately.</td>
</tr>
</tbody>
</table>

Recommended Treatment

<table>
<thead>
<tr>
<th>Recommended Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bacterial:</td>
</tr>
<tr>
<td>• Polymyxin B/Trimethoprim sol. 1-2 gtt every 3-6 hours for 7-10 days</td>
</tr>
<tr>
<td>• Erythromycin ophthalmic ointment, ½ inch to conjunctiva qid x 7 days</td>
</tr>
<tr>
<td>• Neisseria (suspected):</td>
</tr>
<tr>
<td>• Ceftriaxone 1g IV x 1 dose (likely also cover Chlamydia with Azithromycin 1g PO x 1)</td>
</tr>
<tr>
<td>• Contact Lens Wearers:</td>
</tr>
<tr>
<td>• Fluoroquinolone for pseudomonas coverage,</td>
</tr>
<tr>
<td>- Levofloxacin 0.5% sol, 1-2 gtt every 2 hours while awake for 2 days, then every 4-8 hours for 5 days</td>
</tr>
<tr>
<td>- Moxifloxacin 1% 1-2 gtt q2h while awake</td>
</tr>
<tr>
<td>• Discontinue contact lens use until 24 hours after discharge and sclera clears</td>
</tr>
</tbody>
</table>

Recommended Follow-Up/Consultation

<table>
<thead>
<tr>
<th>Recommended Follow-Up/Consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• If contact lens wearer, should follow-up with ophthalmology within 24 hours or sooner if able</td>
</tr>
<tr>
<td>• If uncomplicated, may follow up with ophthalmology or PMD within 1 week as needed.</td>
</tr>
</tbody>
</table>

**Viral Conjunctivitis**

- The most common cause of conjunctivitis.
  - Adenovirus is the most common cause.
- Generally produces more redness, itching, eye irritation, **clear watery** discharge.
- Commonly occurs in setting of other viral symptoms.
- Very contagious for 10-12 days after onset.

**Recommended Treatment**

- Self-limited and benign process
- Symptomatic treatment: Artificial tears, cool compresses
  - Topical antihistamines for itching if present
- If diagnosis is in question, may opt to treat as bacterial conjunctivitis

**Recommended Follow-Up/Consultation**

- May follow up electively with PMD
- If symptoms severe or persistent, consider referral to ophthalmology

---

Allergic Conjunctivitis

- Ocular allergy is estimated to affect 20% of the population on an annual basis
- Does not threaten vision
- Itching, tearing, conjunctival edema, watery discharge, burning, photophobia, eyelid edema.
- Itching is what predominates when compared to other forms of conjunctivitis.

**Diagnosis/Description of Condition**

- Strict instructions to not rub eyes, as this can cause further mast cell degranulation and worsening of symptoms.
- Artificial tears and cool compresses
- Topical antihistamines for symptom relief.

**Recommended Treatment**

- May follow up electively with PMD
- If symptoms severe or persistent, consider referral to ophthalmology

**Recommended Follow-Up/Consultation**