The Unilateral Red Eye: Separating Dangerous from Non-Dangerous
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Objectives
1. Develop a strategy for examining EVERY unilateral red eye
2. Identify five dangerous red eyes
3. Know why they are dangerous
4. Review management and treatment

A Red Eye is a Cardinal Sign of Inflammation

in·flam·ma·tion
noun
noun: inflammation; plural noun: inflammations
A localized physical condition in which part of the body becomes reddened, swollen, hot, and often painful, especially as a reaction to injury or infection.

"Patient here with a red eye"

First Decision

Dangerous
Non-dangerous

Inflammation

1. Pain
2. Redness
3. Swelling
4. Heat
40 YOBM - Acute Redness, Photophobia

Dangerous Unilateral Red Eye #1: Anterior Uveitis

Anterior Uveitis

Frequently occurs in young adults

Peak incidence: 20’s-40’s

Anterior uveitis diagnosed based on the presence or absence of WBC’s in the anterior chamber

Blood Aqueous Barrier

Uveitis = Breakdown in Blood Aqueous Barrier

Threats to Vision
Threats to Vision

Peripheral Anterior Synechia

Cystoid Macular Edema

Fibrin = Posterior Synechia

Fibrin in posterior chamber

Posterior synechia

Causes?
Categorization Can Help

<table>
<thead>
<tr>
<th>Acute vs. Chronic</th>
<th>Type of Inflammation</th>
<th>Location</th>
<th>Laterality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute &lt; 3 months</td>
<td>Non-granulomatous</td>
<td>Anterior (75%)</td>
<td>Unilateral</td>
</tr>
<tr>
<td>Chronic &gt; 3 months</td>
<td>Granulomatous</td>
<td>Intermediate (8%)</td>
<td>Bilateral</td>
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<tr>
<td></td>
<td></td>
<td>Posterior/panuveitis (17%)</td>
<td>Alternating</td>
</tr>
</tbody>
</table>

Most Common:
Acute, unilateral, non-granulomatous, anterior uveitis

New Onset Acute Non-Granulomatous Anterior Uveitis

- 50% HLA-B27 positive
- Ulcerative colitis
- Crohn’s disease
- Reactive arthritis
- Ankylosing spondylitis
- Psoriatic arthritis
- 50% have an associated spondyloarthritis (UCRAP)
- 80% of these patients have ankylosing spondylitis
- 50% idiopathic

Granulomatous
Mutton-fat KPs

Iris Stromal Nodules

Granulomatous etiology more commonly infectious

Most Common:
Acute, unilateral, non-granulomatous, anterior uveitis

Iris Stromal Nodules

Granulomatous etiology more commonly infectious
30 YOWF / Pain / Redness / Nausea / Recently Started Topamax® (topiramate)

Dangerous Unilateral Red Eye #2: Acute Angle Closure

Acute Angle Closure: Testing
- IOP (50-100 mmHg)
- Van Herick angles
- Gonioscopy
- Anterior OCT

Acute Angle Closure: Risk Factors
- Age: average 60
- Gender: female 4:1
- Race: Asian decent
- Family history: ocular anatomical features are inherited
- Medications

Acute Angle Closure: Topamax® (topiramate)
- Used to treat migraines, weight loss, epilepsy
- Causes supraciliary effusion moving the lens and iris forward
- Angle closure
- Myopic shift
- Typically occurs within first month of use or if dosage is increased

Acute Angle Closure: Immediate Threat to Vision?

Critical Closing Pressure = CRAO

A infiltrate is a sign of your patient’s immune system attacking an antigen via antibodies.
**Corticosteroids for Bacterial Keratitis**

The Steroids for Corneal Ulcers Trial (SCUT)

Objectives: To determine whether topical corticosteroids improve clinical outcomes with the use of topical antibiotics as adjuvant therapy in the treatment of bacterial corneal ulcers.

Methods: Randomized, placebo-controlled, double-masked, multicenter clinical trial comparing prednisolone to placebo. Bacterial ulcers were enrolled in the 3-month BSCVA (best spectacle-corrected visual acuity) group and patients with bacterial corneal ulcers. In patients with vision of counting fingers only or worse, prednisolone was started at a dose of 1 mg every 12 hours for 2 days, then tapered to 1 mg every 24 hours for 7 days, then 1 mg every 48 hours for 7 days, and then 1 mg every 72 hours for 7 days. The primary outcome was a significant effect of corticosteroids on VA, with a 2-step improvement in BSCVA and no safety concerns with adjunctive corticosteroids.

Between September 1, 2006, and February 22, 2010, 1769 patients were screened for the trial and 500 patients were enrolled. No significant difference was observed in the 3-month BSCVA (P = .40), time to reepithelialization (P = .44), or corneal perforation (P = .99). A significant difference in the Visually Oriented Test for Children was observed in both treatment groups (P = .02; P = .01). The results of the primary outcome of the Canadian National Eye Institute Qualitative Questionnaire were not significant (P = .12; P = .23; P = .25). There were no differences in adverse events between the groups (P = .04). A significant difference in the BSCVA (P = .02) and corneal perforation (P = .04) were observed in both treatment groups.

**Fungal Ulcer/Infectious Keratitis**

Gray-white infiltrate with feathery edges: classic for Aspergillus / Fusarium

Steroids?

For bacterial ulcers the addition of steroids to Vigamox
- did not reduce scar formation
- did not increase re-infection rate
- did not improve VA in the over all group
- no increase in adverse events were found


Candida ulcers can look like bacterial ulcers and be deadly!
Acanthamoeba Keratitis

- Most common protozoa found in soil and frequently in water
- Associated with inadequate contact lens hygiene
- Early: pain is severe and out of proportion of signs
- Late: Patchy anterior stromal infiltrates that can present with overlying pseudodendritic epithelial defects
- Later progress to ring ulcer

Herpes Simplex Virus (HSV)

- Recurrent infections most common in young adults
  - Ask about previous episodes and/or cold sores

Herpes Simplex Virus (HSV) in United States

- Population seropositive by 4 years of age: 25%
- Population seropositive by 60 years of age: 100%
- Lifetime prevalence of ocular manifestations in infected people: 1%


Hangover

HSV Dendrite
The “Great Mimic” of the anterior segment

HSV Corneal Disease

Stromal Disease

Endothelial disease

Epithelial Disease

Dendrite

Vesicles

SPK

Geographic / marginal ulcers

Necrotizing Keratitis

Immune (Interstitial) Keratitis

HSV is the 2nd most common cause of corneal blindness in the United States

Staphylococcal Marginal Keratitis

Chronic blepharitis → Peripheral Infiltrate NO NaFl staining

Corneal scars

Peripheral thinning / neovascularization / scars

Corneal Abrasion/Erosion

(-) Infiltrate + (+) NaFl staining (epithelial defect)

Tree Branch Injury

Corneal Abrasion

Recurrent Erosion
What about if no history of previous trauma?

Epithelial Basement Membrane Dystrophy (EBMD)

Map-lines, dots, and/or fingerprints
[-] NaFl staining (elevated cornea)

10% of EBMD patients develop corneal erosions
50% of patients with corneal erosions will have EBMD

Dangerous Unilateral Red Eye #4: Scleritis

Scleritis [98% anterior]
- Non-necrotizing (84%)
- Necrotizing (14%)

Highest risk of vision loss and death
Scleromalacia perforans: Chronic RA

Scleritis [98% anterior] WITH inflammation
Scleritis [98% anterior] WITHOUT inflammation
Scleromalacia perforans: Chronic RA
Scleritis vs. Episcleritis

**Scleritis**
- Severe pain
- Diffuse deep inflamed vessels
- If nodule: immobile
- 50% associated with systemic disease

**Episcleritis**
- Mild/moderate pain
- Sectoral superficial inflamed vessels
- If nodule: moveable
- 25% associated with systemic disease

Dangerous Unilateral Red Eye #5: Orbital Cellulitis

Orbital cellulitis is a serious infection that can result in a cavernous sinus thrombosis, brain abscess, and/or meningitis if not caught early and managed appropriately.

Preseptal Vs. Orbital Cellulitis

- Headache, fever, general malaise
- Optic nerve involvement
- EOM involvement
- Proptosis

Dangerous Unilateral Red Eyes

- Anterior Uveitis → AC
- Acute Angle Closure → IOP
- Corneal Issues → NaFl
- Scleritis
- Orbital Cellulitis