Practical Problem-Solving of Red Eye in the Contact Lens Patient

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Disclosure Statement:
* Alcon
* Allergan
* AMO
* Bausch & Lomb
* CooperVision
* J&J Vision Care
* Paragon Vision Science
* Polymer Technology

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Red = Inflammation
- Rubor (redness)
- Tumor (swelling)
- Calore (heat)
- Dolore (pain)

Red = Inflammation
- A protective response
- If persists, can contribute to disease
- A red flag that something is amiss!

First Step: A Good History
- While modern medical technology has greatly enhanced our ability to diagnose and treat disease, it has also promoted laziness—especially mental laziness—among many physicians. Habitual reliance on sophisticated medical gadgetry for diagnosis prevents physicians from using the most sophisticated, intricate machine they’ll ever and always have—the brain.

Herbert L. Fred, MD
Professor, Department of Internal Med.
The University of Texas
A Good History

- 442 consecutive patients
- Compared experience:
  - Senior Resident 80.1% (4 yrs)
  - Experience Clinician 84.4% (>20 yrs)


A Good History

- Most valuable tools?
  - History alone 19.8% 19.3%
  - Physical examination alone 0.8 0.5%
  - Basic tests (BT) alone 1.1 1.3%
  - Hx + Physical examination 39.5 38.6%
  - Hx + BT 14.7 14.7%
  - Hx + Physical exam +BT 16.9 18.5%
  - Imaging studies 6.5 6.1%


HPI

Where’s the red?
- One or both eyes?
- Overall?
- Paralimbal?

“My eye is red”

- 22 year old college student
- SCL wearer (D/W)/Reusable
- HPI
- Corneal infiltrates OD

“Where’s the red?”

“Where’s the red?”

- Location
  - 22 year old college student
  - SCL wearer (D/W)/Reusable
  - HPI
  - Corneal infiltrates OD
What To Do?

"My eye is red"

- OS:
  - minimal injection
  - 1+ infiltrates superior cornea

Location

- Where's the red?
  - One or both eyes?
  - Paralimbal?
  - Sectoral?
  - Overall?
  - In the aperture? **Dryness**
  - At the eyelid margin? **Blepharitis/MGD**

"My eye is red"

- What we did…
  - Switched her to Hydrogen Peroxide-based care system
  - Asked to return in 2 weeks

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HPI

- How do your eyes feel?
  - Itch ➔ Allergy?
  - Burn ➔ Dryness?

Quality: Itch

- Where?
  - Both eyes? Allergy
  - Nasal canthus? Allergy
  - Eyelid margins? Blepharitis

Quality: Burn

- Where?
  - Both eyes? Dryness
  - One eye? Host of possibilities

HPI

- Location
  - When is the problem?
  - How long is the problem been there?

- Intensity
  - Is the pain minor, moderate, or severe?
  - Medication, or no medication used to help? (if yes, how)

- Quality
  - Describe the quality of the complaint.

- Location
  - Where is the pain?

- Intensity
  - Is the pain minor, moderate, or severe?

- Quality
  - Describe the quality of the complaint.

- Allergy
  - How often does the complaint happen?
  - Established pattern or random? (if yes, how)

- Allergy
  - Does it help?

- Dryness
  - Does it help?

- Rubbing
  - Does it help?

- Soln/Hands/Lotion
  - Helps comfort and vision
Associated symptoms
- Produce matter?
  - Stringy vs globular **Allergy vs Infection**
  - White vs green **Allergy vs Infection**
  - Matted shut in am? **Conj or Bleph?**
- Watery? **Viral? Dryness?**
- Photophobia? **Uveitis/Cornea?**

Red Eye: Potential Causes
- Contact lens wear
- **Modifying factors (What helps?):**
  - Removing CL’s!!!

HPI

Is redness associated with CL wear?
- Do symptoms get worse when you wear your CL’s?
- Do symptoms get better when you remove your CL’s?
- Do you wake up with red eyes?
  - DW?
  - EW?

Is redness associated with CL wear?

Causes of CL Red Eye
- Hypoxia
## Silicone Hydrogels
- More Oxygen!
- 66% of US market

![Silicone Hydrogels Chart]

Nichols, J. *Contact Lens Spectrum*, Jan 2014

## Benefits of Silicone Hydrogels
- Fewer hypoxic changes
  - **Less limbal redness**
    - 31% (EW) - 35% (DW) with hydrogels


## Causes of CL Red Eye

- **Hypoxia**
  - More likely if:
    - Long hours of wear
    - Higher prescription (lower Dk/t)
    - High corneal oxygen demand?

## Corneal Oxygen Demand

<table>
<thead>
<tr>
<th>Quinn and Schoessler</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal Oxygen uptake rate</td>
</tr>
</tbody>
</table>


## Causes of CL Red Eye

- **Hypoxia**
  - More likely if:
    - Long hours of wear
    - Higher prescription (thicker lens)
    - High corneal oxygen demand?
  - Other signs to look for

## Signs of Hypoxia

- **Limbal redness**
- **Neovascularization**
  - 18% with hydrogel EW

Signs of Hypoxia

- Limbal redness
- Neovascularization
- Corneal microcysts
  - 90-100% in hyd EW
  - Low Dk lens wearers switched to high Dk lens

Summary of Hypoxia

<table>
<thead>
<tr>
<th>Ext time</th>
<th>Max corneal microcysts</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL</td>
<td>Low Dk lens wearers</td>
</tr>
<tr>
<td>1M</td>
<td>High Dk lens wearers</td>
</tr>
<tr>
<td>3M</td>
<td></td>
</tr>
<tr>
<td>6M</td>
<td></td>
</tr>
</tbody>
</table>


Silicone Hydrogels

- Mechanical issues
  - SEALS
  - Contact lens-induced papillary conjunctivitis (CLPC)
    - Higher rate of local CLPC with SiHy lenses (4.6%)


Causes of CL Red Eye

- Hypoxia
- Mechanical/Allergic

Silicone Hydrogels

- Mechanical issues
  - SEALS
  - Contact lens-induced papillary conjunctivitis (CLPC)
    - Higher rate of local CLPC with SiHy lenses (4.6%)
    - DD SiHy: rate significantly reduced


GPC (CLPC)

- Symptoms:
  - Itchy/mucous
  - Len decentration/intolerance
- Onset:
  - Variable/allergy season?
- Treatment:
  - D/C CL wear
  - Steroids/antihistimine/mast cell stabilizer
  - Refit/DD

A (Lid) Flip Should Be Part of Every CL Exam!

Gabby Douglas, US Olympian

Causes of CL Red Eye
- Hypoxia
- Mechanical/Allergic
- Corneal Infection/Inflammation

Silicone Hydrogels
- To the Rescue?
- MK rates unchanged with EW (~5xDW)
  - 1989 (Hyd): 20.9/10,000
  - 2005 (SiHy): 18.0/10,000
  - 2008 (SiHy): 25.4/10,000

     *Ophthalmology* 2005 Dec; 112(12):2172-9

- Concern about corneal inflammatory events (CIEs)
  - 26.7% incidence
  - 2x increase vs hydrogel


CLARE (Contact Lens Associated Red Eye)
- Symptoms
  - Watery, painful eye
- Onset
  - On waking with EW
- Etiology
  - Gram neg bacteria
- Treatment
  - D/C CL Wear/Meds?
  - 1/3 will recur

  1. Fonn, D and Slivak, A. 

CLPU (Contact Lens Peripheral Ulcer)
- CLPU

(Courtesy: CCLRU/LVPEI Guide to Corneal Infiltrative Conditions)
Silicone Hydrogels

- MK rates unchanged (~5xDW)
- Concern about corneal inflammatory events (CIEs)
  - 26.7% incidence
  - 2x increase vs hydrogel
  - Material/wear sch/other?


Risk factors for CIEs

- Bacteria bind in higher levels to SiHy lenses
- Related to increase in CIEs?


Contact Lens Safety

- Chalmers et al. March 2012
  - Incidence of CIEs:
    - 12.5 X less likely with Daily Disposable vs reusable lenses


Daily Disposables: Usage in USA

- 2009: 11%
- 2010: 13%
- 2011: 14%
- 2012: 17%
- 2013: 20%

Nichols, J. Contact Lens Spectrum, Jan 2014

Why Not DD?

- Limited Parameter Availability?
  - Spheres
  - Tinted Spheres
  - Torics
  - Multifocals

- Concerns about Overwear?
Lens Over-Wear
- Compliance with replacement is higher than 2wk or 1 mo: Why?
  - Easy
    - Lead cause of non-compliance:
      - Forgot which day due to replace
      - Not an issue with DD!
    - No change in behavior required

Why Not DD?
- Limited Parameter Availability?
- Concerns about Overwear?
- Cost?

Confronting Cost-Perspective
- Up-front cost vs Long-term benefits
- CL-induced infiltrates in USA in 2010:
  - Severe:
    - 17,248 cases
    - $1,500/episode
  - Non-Severe:
    - 32,031 cases
    - $1,000/episode
  - Total Cost: $58 million overall

Confronting Cost: The Facts
- 1-Day 2-wk
  - Cost (1 yr supply) $value $value
  - Solution Costs -0- $value $value
  - Rebates $value $value
  - Difference(2 wk)*: $0.26 more per day
  - Difference (Monthly)*: $0.10 more per day

For Part-Time Wearers: cheaper than reusable!

Confronting Cost-Fee Setting
- Material price competitive with on-line
  - Profit: 2 x more than 2wk or Monthly
- Additional incentive
  - Reduced fitting fee
- Total Profit
  - 30% higher than 2 wk
  - 23% higher than Monthly

Daily Disposables- Benefits
- It’s what’s best for the patient
  - “Dirty lenses create most contact lens complications”
Sources of Microbial Contamination

- Contact Lens Case
- Solution Bottle
- Hands
- Environment – soil, water
- Old, deposited contacts

Handwashing

- Hands as a vector, even with DD
  - Lipid Deposits
  - Bioburden
  - Discomfort
  - CIEs
  - MK


CONTACT LENS HEALTH WEEK

November 17–21, 2014

The Centers for Disease Control and Prevention (CDC)
Invites you to celebrate Contact Lens Health Week this November!
Help spread the word about healthy contact lens wear and care.
Learn more and download free health promotion materials, including:
- Printables posters
- Infographics
- Buttons and badges for websites
- A library of short messages for use on social media channels
- And much more!

www.cdc.gov/contactlenses
For more information, email: healthywater@cdc.gov

American Optometric Association

Anterior Segment Image Catalog
Brought to you by the Contact Lens and Cornea Section

Anterior Segment
Conj & Sclera
Contact Lenses

Cornea
Eyelids
Surgery

Take-Aways

- Detailed History: is a powerful tool: give time to it
- Where’s the redness?
- Itch doesn’t necessarily mean allergy (though it might!)
- Burn doesn’t necessarily mean dryness (it might!)
- Key Indicators that CL’s are contributory to redness:
  - Improvement with contact lens removal
  - Worsening with contact lens application
- Likely Contact Lens Culprits:
  - Hypoxia (especially with extended wear and high Rx)
  - Mechanical/ Allergic
  - Infection/ Inflammation
- Clean Lenses and Clean Hands!
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