Contact Lenses as a Predisposing Factor to Dry Eye

- Soft contact lenses have been shown to increase evaporation of the tears
- Irrespective of the evaporation from the contact lens hydration itself


Contact Lenses as a Predisposing Factor to Dry Eye

- When tear production is compromised by anything including a contact lens, evaporation increases significantly

Complications of Dry Eye in Contact Lens Wearers

• Deficiencies in tear volume result in osmolarity changes, but a decrease in key enzymes like lysozyme, lactoferrin and beta-lysin

• Lemp, MA. Is the Dry Eye Contact Lens wearer at Risk? Yes. Cornea 1990;9 Suppl 1 S48-50

Ocular Surface Disease

Keratoconjunctivitis Sicca

– Irregular and Poorly Lubricated Corneal Surface
– Altered Barrier Function

Complications of Dry Eye in Contact Lens Wearers

• Can potentially lead to an increased risk of infection
• Primarily in soft contact lens wearers with poor tear exchange under the lens

• Lemp, MA. Is the Dry Eye Contact Lens wearer at Risk? Yes. Cornea 1990;9 Suppl 1 S48-50

Complications of Dry Eye in Contact Lens Wearers

• Limited tear flow allows for a greater build up of lens deposits and metabolic waste
• Permits increased tear evaporation from the contact lens

• Lemp, MA. Is the Dry Eye Contact Lens wearer at Risk? Yes. Cornea 1990;9 Suppl 1 S48-50
Signs of Compromised Wetting/Surface Chemistry

- Mucin Balls
- Lipid Deposits
- Poorly Wetting Surface

Wetting agents and surface treatments lack the natural wetting characteristics of hydrogels.

Other predisposing factors

- Age
- Gender
- Environment
- Anterior Segment Disease
- Medications
- Refractive surgery
- Systemic Disease

Gender

- Sjogren’s: Dry eye is characterized by a triad of dry eye, dry mouth, and associated auto-immune disorders.

- Prevalence
  - 0.4%
  - 95% women

Prevalence of Dry Eye

(continued)

Prevalence by Age and Gender – WHS Study
Environment

• Air conditioners or heaters
• Airline travel
• Winter months, allergy season
• Ceiling fan
• Exogenous irritants
• Reading time/Computer

Top 3 intake causes of dry eye?

• Smoking
• Caffeine (more than moderate)
• Diet

Also alcohol and systemic medications are top intake causes of dry eye

Anterior Segment Disease

• Blepharitis/Meibomitis
• Patients are 2 x more likely to have dry eye symptoms
• Could be related to systemic conditions such as acne rosacea

Dysfunctional Tear Syndrome

• Most common presentation: “No lid margin disease”
• Treatment decision based on severity level

Behrens et al, submitted
Acute presentation of MGD?

Frothy/foamy tear film
Mild/Acute

- Hot compresses
- Lid hygiene

Multiple-Dose Rabbit: Azithromycin
Concentrations in Rabbit Conjunctiva

[Graph showing concentration levels over time]


Multiple-Dose Rabbit: Azithromycin
Concentrations in Rabbit Eyelid

[Graph showing concentration levels over time]

A Novel Combination

ZYLET contains
- Loteprednol etabonate 0.5%
- Tobramycin 0.3%

Loteprednol Etabonate:
The first and only ester steroid...with anti-inflammatory effect derived from prednisolone molecule

Systemic medications
- Antihistamines
- Diuretics
- Antihypertensives
- Anticholinergics
- Antidepressants
- Cardiac antiarrhythmic
- Oral contraceptives
- Hormone replacement therapy
Tear Volume in Ocular Allergy Patients

![Graph showing Tear Volume over Days of Treatment with ELESTAT® and Claritin®.]

- ELESTAT® (Epinastine HCI ophthalmic solution) 0.05%
- Claritin®

- N = 18
- P = .0357
- 34% Reduction

Tear Flow in Ocular Allergy Patients

![Graph showing Tear Flow over Days of Treatment with ELESTAT® and Claritin®.]

- ELESTAT® (Epinastine HCI ophthalmic solution) 0.05%
- Claritin®

- N = 18
- P = .0378
- 35% Reduction

Symptoms of Dry Eye

- Burning
- Stinging
- Transient blur
- Dry eye sensation
- Photophobia
- Epiphora
- Contact lens intolerance
- Injection
- Increased blink rate
- Foreign body sensation

Examination
External examination

- Skin
- Eyelids
- Cranial nerve function
- Hands

Diagnostic Tests

- Pt questionnaire
- Tear meniscus height
- Tear break-up
- NAFL Dye
- Rose Bengal or Lissamine Green
- Schirmer test - phenol thread test
OcuSense TearLab

Treatment

Contact lens wear modifications
- Schedule & Care
- Non-ionic, low water content
- Silicone Hydrogel
- Type of Lens- disposable

Dry Eye Management of the Contact Lens Patient
- Low water content lenses appear to remain hydrated for a longer period than high water content lenses

Mackie IA. Contact lenses in dry eyes. Trans Ophthalmolog Society U K. 1985;104(pt 4):477-83
Dry Eye Management of the Contact Lens Patient

• Non-ionic, low water content lenses show a statistically significant improvement in a number of subjective parameters including comfort, dryness, frequency of eye irritation and frequency of burning

  • *Lemp MA, Caffery B, Lebow K et al. Omafilcon A (Proclear) soft contact lenses in a dry eye population. CLOA J. 1999 Jan;25(1):40-

Dry Eye Management of the Contact Lens Patient

• High water content lenses may be more comfortable but require increased lubrication and/or punctal occlusion

  • *Foulks GN, Harvey T, Raj CV. Therapeutic contact lenses: The role of high Dk Lenses. Ophthalmology Clinics of North America. 2003 Sep;16(3):455-61

ProClear Hydrogel lenses:

Are the only lenses that have FDA clearance to be labeled as “may provide improved comfort for cl wearers who experience mild discomfort or symptoms relating to dryness during lens wear associated with Evaporative Tear Deficiency or Aqueous Tear Deficiency (non-Sjorgen’s only)”

Dry Eye Management of the Contact Lens Patient - SiHy

• Studies have suggested that silicone lenses may be beneficial

  • *Mackie IA. Contact lenses in dry eyes. Trans Ophthalmolog Society U K. 1985;104(pt 4):477-83

• If epithelial healing in required silicone hydrogel lenses may be a better choice

  • *Foulks GN, Harvey T, Raj CV. Therapeutic contact lenses: The role of high Dk Lenses. Ophthalmology Clinics of North America. 2003 Sep;16(3):455-61
### SiHy Comparisons

<table>
<thead>
<tr>
<th>Feature</th>
<th>biony/x Avaira</th>
<th>Acuvue Advance</th>
<th>Acuvue Oasys</th>
<th>AirOptix</th>
<th>Night &amp; Day</th>
<th>PureVision</th>
</tr>
</thead>
<tbody>
<tr>
<td>High water content (&gt;45%)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Low Modulus (&lt;0.75)</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Low wetting angle (&lt;35°)</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>Modality</td>
<td>Monthly (B) / 2 week (A)</td>
<td>2 week</td>
<td>2 week</td>
<td>monthly</td>
<td>monthly</td>
<td>monthly</td>
</tr>
<tr>
<td>Aspheric front surface optics</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Rounded edge design</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
</tbody>
</table>

### Dry Eye Management of the Contact Lens Patient - Daily Disposable

- Daily disposable lens may benefit patients in reducing protein build up
- Besides dry eye, this approach may also be especially important in patients who suffer from allergies and blepharitis

  *Lemp MA. Contact lenses and associated anterior segment disorders: dry eye, blepharitis and allergies. Ophthalmology Clinics of North America, 2003 Sep;16(3):463-

### Treatment – AT’s

- Blink Tears & Oasis Tears
- FreshKote
- Soothe XP vs. Soothe Alginate
- Optive
- Systane Ultra
- Blink contact lens
- Refresh contact lens

### Can Add Therapeutics

- Steroids and cyclosporine A
- May require removing patient from contact lenses
- Not often well received
- BID may be only option
- Consider punctal occlusion
**Targeted Treatments**

- Treatments aimed at local inflammatory processes
  - Topical corticosteroids
    - Effective anti-inflammatory agents
    - Site specific Steroids
  - Cyclosporin A (Restasis)

**Steroid Treatment**

- Loteprednol 0.2% (Alrex)
- Loteprednol 0.5% (Lotemax)

- Less side effects - M Abelson 88 patients 35 days
- IOP rise, secondary infection or PSC formation: 0%
- No reported cases of PCS cataract in over 6 Million prescriptions (IMS Health Data)

**Ester vs. Ketone Steroids**

- *Ester Steroids* are inactivated by naturally occurring esterases
  - less side effects
- *Ketone Steroids* are not inactivated and have propensity to remain in anterior chamber post breakdown as active metabolites

**Ester vs. Ketone Steroids**

- Loteprednol — ester steroid
- Prednisolone — ketone steroid
- Fluorometholone
- Dexamethasone
- Medrysone
- Rimexolone
How Does Restasis™ Work?

• Restasis™ prevents T-cell activation
  (Kunert et al, Arch Ophthalmol. 2000;118:1489)
  – Activated T cells produce inflammatory cytokines that result in:
    • Recruitment of more T cells (Stern et al, IOVS. 2002;43:2609)
    • More cytokine production (Pflugfelder et al, Curr Eye Res. 1999;19:201)

Topical Cyclosporine

• Restasis Ophthalmic Emulsion (Allergan)
  – Useful in long-term management of inflammatory DES
  – BID dosage
  – Cyclosporine A (CsA) 0.05% in castor oil vehicle
  – Mechanism of action:
    • Inhibits activation of inflammatory T-lymphocytes, and induces immune cell apoptosis, stimulating lacrimal gland tear production
    • 3-4 months to achieve clinically significant effect, 6 months for full therapeutic potential
  – 59% Patients achieved improvement from baseline Schirmer scores at 6 months
  – Excellent safety profile
Topical Cyclosporine

Onset of Action: “How quickly did Restasis® Ophthalmic Emulsion start working?”

- 70% of chronic dry eye patients reported relief within 3 weeks of starting treatment

Goblet Cell Density

Punctal occlusion can allow for BID dosing

- Studies show that an increased therapeutic effect may be possible with punctal occlusion
- May allow bid dosing
- Patients can remain in contact lenses
Punctal Occlusion

- May worsen certain conditions
- Allergies
- MGD

- Ideal as final treatment option and in LASIK dry eye management

DTS Treatment Algorithm

### LEVEL 1
If no improvement, add level 2 treatments
- Patient education
- Environmental modifications
- Control systemic medications
- Preserved tears
- Allergy control

### LEVEL 2
If no improvement, add level 3 treatments
- Unpreserved tears
- Gels/nighttime ointments
- Nutritional support
- Cyclosporin A
- Topical steroids
- Secretagogues

### LEVEL 3
If no improvement, add level 4 treatments
- Tetracyclines
- Punctal plugs (control inflammation 1st)

### LEVEL 4
- Systemic anti-inflammatory therapy
- Antibiotics
- Moisture goggle
- Surgery (punctal occlusion)

Managing Ocular Surface Disease in the Contact Lens Practice

- Contact lens wear is one of many predisposing factors
- Contact lens modification options exist
- Dry eye must still be treated
- AT’s and rewetting drops
- Therapeutic medications
- Punctal plugs
- Keeping patients in CL creates happy patients and a successful practice