New Advances in the Management of Lid Disease

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Lid Disease Fundamentals

- Association or synonymous with Dry Eye
- Differentiating anterior blepharitis from MGD
- The various types of blepharitis
- Terminology: MGD, meibomitis etc.
- Treatment options
- New understandings of lid margin disease
- Communicating that information

Lacrimal Functional Unit (LFU)

- Tear film
- Lacrimal glands
- Corneal and conjunctival epithelia
- Meibomian glands
- Homeostasis controlled by nerve connections and systemic hormones

DTS: Clinical Categories

- Most common presentation: "No lid margin disease"
- Treatment decision based on severity level

Barabino S et al. Prog Retin Eye Res. May 2012
Behrens et al. Cornea 2006
Lacrimal Functional Unit (LFU)

- Anti-inflammatory factors such as expression of vascular endothelial growth factor receptor-3, and regulatory T-cells play an active role in protecting the ocular surface.
- Prevention may represent the most promising therapeutic strategy!

Barabino S et al. Prog Retin Eye Res. May 2012

Key Tests for OSD Diagnosis

- Questionnaire e.g. SPEED, OSDI etc.
- POC: Osmolarity/InflammaDry
- MG Expression
- Ocular surface staining
- Blink analysis
- Meibography may replace previous testing and enhance meibomian gland evaluation
Key Tests for OSD Diagnosis

- Lid Margin Disease
- Anterior Blepharitis
- Meibomian Gland Dysfunction
- Evaporative Dry Eye
- Contact Lens Intolerance
- Surgical Complications
  - Pre-Existing (Bacterial Colonization)
  - Post-Operative Outcomes (Lipid Insufficiency)
- Unstable Tear Film
- Lipid Insufficiency
- Bacterial Colonization in the Lids
- Surgical Complications
  - Eyelash Loss
  - Styes or Chalazion
  - Post-Surgical Infections
    - Demodex
    - Seborrhea Staph Aureus

Anterior Blepharitis
Anterior Blepharitis

- Inflammation of the eyelids usually caused by bacterial infection (staphylococcal) of the eyelid margin
- Infection normally occurs at the origins of the eyelashes and involves the lash follicles and the meibomian glands
- Signs and symptoms include:
  - Morning crusting of lids
  - Loss of lashes
  - Collarettes - scales that encircle lash
  - Lid margin redness
  - Conjunctival hyperemia

Anterior Blepharitis: Staphlococcus
Anterior Blepharitis

Target Profile For Optimal Treatment of Lid Margin Disease

Anterior Blepharitis: Staphylococcal

- Broad spectrum antimicrobial activity → eliminate the bacteria in acute cases
- Anti-inflammatory effect → reduce the inflammation
- Good penetration → high levels at site of disease
- Long contact time
- Convenient dosing → promote good compliance

Anterior Blepharitis Treatment

• Current treatment options
  - Lid hygiene with hot compresses
  - Commercial lid scrubs
  - Antibiotic ointment to lid margin (Bacitracin, Erythromycin)
  - Corticosteroids for persistent inflammation (Lotemax ung)
Typical Antibacterial Choices

- Macrolide: erythromycin ung
- Bacitracin ung
- Polysporin ung
- AzaSite QHS

Typical Anti-inflammatory Choices

- Combination drops and ointments
- Steroid drops and ointments

Anterior Blepharitis: ?
Anterior Blepharitis: 

Target Profile For Optimal Treatment of Lid Margin Disease

Anterior Blepharitis: Demodex

- Tea-Tree oil ~ 50%
- Cliradex and Cliradex Complete (4-Terpeniol)
- OcuSoft Demodex Kit (contains buckthorn seed oil)
- Make in office?
- SteriLid for maintenance
Target Profile For Optimal Treatment of Lid Margin Disease

**Anterior Blepharitis: Seborrhea**

- Dermatological prep such as triamcinolone 0.1% cream BID or QD
- No more than 2-3 weeks duration
- Lotemax ointment if fear patient may get in eyes
- OcuSoft Lid Scrub Plus for maintenance
Frothy / Foamy Tears = MGD

Chronic changes

• Telangiectasia

• Scarring
Chronic changes

LipiView DMI

LipiView DMI
Four Components to MGD

- Congestion/inspissation
- Bacterial biofilms?
- Inflammation
- Tear film alterations

The device applies controlled heat to the inner upper and lower palpebral conjunctival surfaces and lid margins, while simultaneously applying pulsating pressure over the upper and lower (outer) eyelids.

**THE LIPIFLOW** (TearScience Inc., Morrisville, NC)

Exotoxin-laden biofilms are the root cause of blepharitis

Exotoxin-laden biofilms are the root cause of blepharitis

**White Blood Cell in Action**

**Hypochlorous Acid (HOCl)**
- Natural Compound
- NYC-101 – Stable Formulation
- Rapid Acting

**N-Chlorotaurine (NCT)**
- Natural Compound
- Rapid Acting
- Effective
- **BUT** Unstable
Treating the BioFilm

- BlephEx
- Avenova Cleanser from NovaBay or HypoChlor from OcuSoft
- Surfactant Based Lid Hygiene products e.g. Lid Scrub Plus, SteriLid etc.
- Antibiotics etc.

Treating Inflammation

- Combination agents bid
  - Zylet, Tobradex, Tobradex ST
- AzaSite QHS
- Steroid ointments (lotemax, FML, Maxitrol etc)
- Oral Doxycycline (50mg or 20mg)
- Nutritional supplements (EPA/DHA/GLA)

Tear Film Alterations

- Choice of artificial tears depends on two things:
  - MG expression
  - Osmolarity
Tear Film Alterations

- Choice of artificial tears:
  
  - High osmolarity/advanced MGD: Blink or TheraTears or RetainMGD
  - Low osmolarity/moderate MGD: Systane Balance, Refresh Optive Advanced, RetainMGD, SootheXP

MGYLS

- Symptomatic CL wearer: 4.8
  
  - Asymptomatic non-CL: 5.5
  - Asymptomatic RGP wearer: 9.0
  - Asymptomatic SCL wearer: 10.7

Potential Theories on major causes of the high incidence of MGD in North America

- Diet
- Hormonal
- Contact lens wear (Villani E et al)
- Heredity
TREATMENT

Mild/Acute

• Hot/warm compresses
• Lid hygiene
• Lipid based tears for mild to moderate
• Osmolarity lowering tears for moderate to severe

Bruder Hydrating Mask
Liposome Spray

- Self-closed colloidal particles
- Membranes composed of one or more lipid bilayer(s)
- The surfaces of bilayers are hydrophilic while the interior, which contain hydrocarbon chains, are hydrophobic
- Because of the different microenvironments in their structure, liposomes can encapsulate hydrophilic molecules
- Applications for lid disease but also drug delivery, diagnostics, computer vision syndrome and nutraceuticals

Moderate/Acute

- Zylet
- Tobradex ST
- Tobradex
- Maxitrol
- AzaSite
- Lotemax ung or FML ung QHS

Long Term

- Pulse dose medications periodically
- Steroids when symptoms are worse
- Essential fatty acids
  - EPA
  - DHA
  - GLA
Potential Chronic Changes

• Telangiectasia

• Dislocation of meibomian glands/ gland atrophy

• Scarring/atrophy

Moderate/severe or not improving

• Add PO tetracycline
• Recommendation:
  • Doxycycline 50mg bid x 4-8 weeks then taper to qd
  • Doxycycline 20 mg bid (periostat can be expensive)
  • Time Release 40mg (can be expensive as well)
Tetracyclines

- Antibiotics inhibit bacterial protein synthesis by binding 30S ribosome
- Anti-inflammatory properties
  - decreases IL-1, TNF-α
  - decreases NO production
  - decreases HLA Class II antigen expression
  - decreases metalloproteinase production and activation
- Decrease symptoms and joint destruction in RA

Contraindications

- Pregnant, nursing or even of child bearing age
- Children

Tetracycline

- Pregnancy ratings:
  - A, B, C, D, X
- Rating on tetracycline: D
Cautions

- Photosensitivity
- Chelates with dairy products, antacids etc.
- Minocycline may cause vestibular toxicity
- Number one drop-out reason?
- GI problems

How to Minimize Stomach Problems with Tetracycline

1. Do not take the second pill (bid) before going to bed
2. Do not take pills with acidic beverages
3. Take pills with food (except a high dairy meal)
4. Prescribe the lowest dose available

Nutritional Supplements: Essential Fatty Acids

- Omega fatty acids shown to help with dry eye disease:
  - ALA: e.g., flaxseed oil
  - EPA/DHA: e.g., fish oils
  - GLA: e.g., black currant seed or evening primrose oil
Effect of Essential fatty acids on MGD inflammation

- Role of good Omega-6 (GLA) vs. Omega-6 LA vs. lid hygiene (control)
- 57 patients randomized and analyzed MG secretions, obstruction, hyperemia and staining
- Statistically significant improvement in ALL groups on GLA compared to LA or lid hygiene

Pinna A et al. Cornea Apr. 2007

Omega Balance

- North American diet (type)
  - 1.6 g/day of ALA (ω-3) (oils, fatty fish, egg white)
  - 12-16 g/day of ω-6 (meat, fried meals)

- Ideal diet (g/day)
  - 3 ω-3: means to increase daily consumption x 2
  - 7.55 ω-6: means to reduce daily intake x 2

- Ideal ratio (3/6)
  - 1:4 to 1:2.5

Omega and Dry Eye

- LA / GLA (ω-6)
  - Increase "good" PG (PGE-1)
  - Against scale surface inflammation
  - Increase tear production


- Help to maintain MG function (Macsai, 2008)
Omega and Dry Eye

- ALA (ω-3; flaxseed oil)
- Helps to restore ocular health
- Blocks cytokine release (IL-1) and release of necrosis factors (TNF-α)
- Reduce local leukocytes action
- Contra-indicated if GI problems or history of prostate disease
- Conversion rates in men

Omega and Dry Eye

- EPA/DHA
- Cold water fish
- More absorption
- Triglyceride vs. Ethyl Ester
- USP Certified
- Dosing?
  - Depends on 2 key things
    - Current level of nutrition
    - Current disease state
- Contraindications
  - Blood thinners?

<table>
<thead>
<tr>
<th>Ingredient and Dose</th>
<th>Inclusion Rationale</th>
<th>Dose Rationale</th>
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</thead>
<tbody>
<tr>
<td>Vitamin A, 2080 IU</td>
<td>Required for expression of gene encoding for mucin</td>
<td>Lower than DV to avoid vitamin A excess if combined with other supplements</td>
</tr>
<tr>
<td>Vitamin E, 12 IU</td>
<td>Fat soluble antioxidant—free radicals result from chronic inflammation</td>
<td>Let these should protect GLA, ALA &amp; DHA from oxidation</td>
</tr>
<tr>
<td>Vitamin C, 240 mg</td>
<td>Key antioxidant in eye</td>
<td>Limited amount needed to protect GLA, ALA &amp; DHA from oxidation</td>
</tr>
<tr>
<td>Vitamin B6, 12.6 mg</td>
<td>Co-factor for fatty acid metabolism</td>
<td>Poor status common in older individuals</td>
</tr>
<tr>
<td>Magnesium, 40 mg</td>
<td>As above</td>
<td>As above</td>
</tr>
<tr>
<td>GLA, 235 mg</td>
<td>Clinical support for reducing objective &amp; subjective symptoms of dry eye</td>
<td>In range of amounts tested in studies. Also provides GLA from black currant oil</td>
</tr>
<tr>
<td>EPA, 100 mg</td>
<td>Provides anti-inflammatory prostaglandins</td>
<td>Balanced amount of GLA and EPA ensures no GLA goes to arachidonic</td>
</tr>
<tr>
<td>Mucin Complex, 100 mg</td>
<td>May provide building blocks for body's synthesis of mucin</td>
<td>Simply a contribution of specific mucin sugars</td>
</tr>
</tbody>
</table>
GLAUCOMA SIMILARITY

• Look at the structure and functioning of the MGs and ocular surface
• Multiple testing:
  • IOP = osmolarity
  • VF testing = corneal staining
  • OCT = meibomography
  • MG expression = ONH examination

FUTURE: DENTAL MODEL

• Tooth brush & floss = Hydrating compress and lid hygiene and ATs
• Dental cleaning = mechanical cleaning and MG expression (mechanical or otherwise)
• Dental x-rays = meibomography

THANK YOU

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www.ophthalmicresources.com