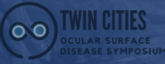


Eyelids and Dry Eye Disease

Elizabeth Yeu, MD

Assistant Professor, Eastern Virginia Medical School
Virginia Eye Consultants
Cornea, Cataract, External Disease and Refractive Surgery
Hampton/Norfolk/Suffolk/Virginia Beach, VA



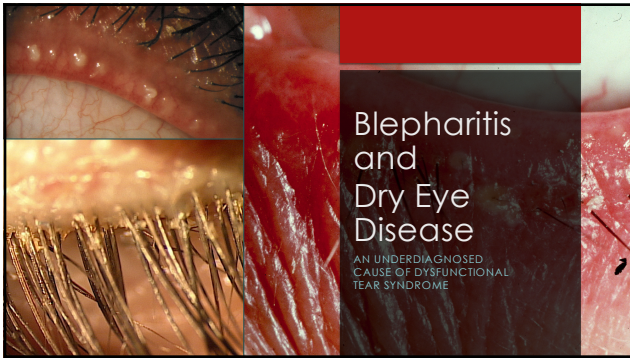
Financial Interests Disclosure

- Alcon: C, R
- Allergan: C
- Aurea Medical: C
- Avedro: C
- Bausch & Lomb/Valeant: C, R
- BioTissue: C, R
- Beaver Visitec: C
- Bruder: C
- EyePoint Pharmaceuticals: C
- iOptics: C, R
- Glaukos: S
- Guidepoint: C
- J & J Vision: C
- LENSAR: C
- Kala Pharmaceuticals: C
- Merck: C
- Mynosys: C
- Novartis: C
- Ocular Science: C, R
- Ocular Therapeutic: C
- Ocusoft: C
- Omeros: C
- Oyster Point Pharmaceuticals: C
- Science Based Health: C
- Shire: C
- Sight Sciences: C
- SightLife Surgical: C
- Sun: C
- TopCon: C, R
- TearLab Corporation: C, R
- TearScience: C
- Zeiss: C

Eyelid Diseases and OSD

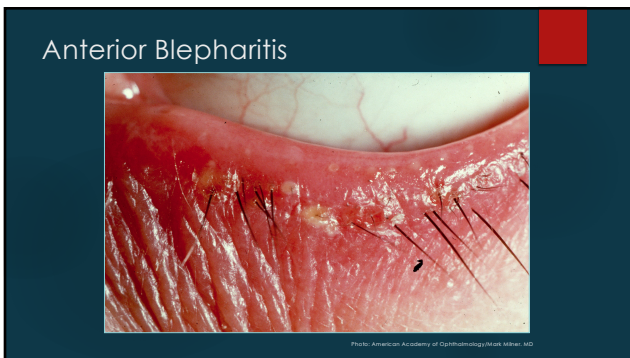
- Anterior blepharitis
 - Staph blepharitis, Demodex
- Posterior blepharitis
 - Meibomian gland dysfunction
- Blepharospasm
- Filamentary keratitis
- Aesthetics
- Poor Blink
- Conjunctivitis: acute, chronic
- Exposure keratopathy
- Conjunctival scarring
 - Symblepharon
 - Tarsal Scarring





Blepharitis

- Cutaneous**
 - Allergy - eg, contact dermatitis; eczematoid blepharitis
 - Seborrheic blepharitis
- Anterior**
 - Infectious – staph (commonly staph aureus), herpes simplex virus, fungal, Demodex
- Posterior**
 - Meibomian gland disease
 - Rosacea blepharitis



Anterior Lid Margin

- ▶ Anterior blepharitis most commonly due to staphylococcal infection (i.e. *S. aureus*, *S. epidermidis*)

Posterior Blepharitis
Meibomian Gland Disease



Photo: American Academy of Ophthalmology/Purchased by Mark Miller, MD

Pathophysiology of Meibomian Gland Disease

- ▶ Normal meibomian gland secretions convert from unsaturated lipids that melt at body temperature to saturated fats that inspissate the meibomian glands
- ▶ Lid microbes secrete lipases that break down lipids to soaps and fatty acids

Bacterial Lipases Break Down Lipids to Soaps




Photo: American Academy of Ophthalmology/Purchased by Mark Nibran MD

Blepharitis/MGD Treatment Options

- ▶ **Posterior blepharitis**
 - ▶ Hot compresses and massage
 - ▶ Antibiotic ointment and drops (erythromycin, azithromycin)
 - ▶ Corticosteroids
 - ▶ Oral tetracyclines, esp. with facial involvement
 - ▶ Nutritional supplements
 - ▶ Cyclosporine A (off-label in United States)
 - ▶ Lifitegrast (off-label in United States) in theory based on anti-inflammatory effects
 - ▶ Dapsone – compounded
 - ▶ Thermal + Expression interventions (LipiFlow, iLux, TearCare)

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Anti-Inflammatory Effects of Macrolides (Erythromycin, Azithromycin)

- ▶ The anti-inflammatory effects of macrolides have been known for the last 40+ years
- ▶ Macrolides prevent the formation of:
 - ▶ Proinflammatory mediators
 - ▶ Cytokines
 - ▶ Prostaglandins
 - ▶ Tumor necrosis factor α

Amadori GW. Antimicrob Chemother. 2010; Jan;50(1):1021

Topical Azithromycin: OFF-LABEL USE FOR BLEPHARITIS

- ▶ Broad coverage
 - ▶ Effective against lid flora commonly associated with blepharitis
- ▶ High tissue concentrations
 - ▶ Concentrations above minimum inhibitory concentrations
 - ▶ Prolonged drug delivery - sustained release
- ▶ Anti-inflammatory effects
- ▶ Dosing
 - ▶ Bid for 2 days; qhs for 1 month, then:
 - ▶ 1 month on, 1 month off vs OU qhs first week of every month


Blepharitis: Other Innovative Treatments

- ▶ Metronidazole ophthalmic ointment - compounded
- ▶ Topical doxycycline drops - compounded
- ▶ Topical clindamycin ointment - compounded
- ▶ Oral nutritional supplements
 - ▶ Flaxseed oil (short-chain omega-3 fatty acid) - thins meibomian gland oils and thickens the oil layer but does not suppress inflammation
 - ▶ Fish oil (long-chain omega-3 fatty acid) - suppresses inflammation, but does not thicken the oil layer
- ▶ Androgen therapy
- ▶ Pulsed light therapy (IPL)
- ▶ LipiFlow, EyeXpress, MiboFlow, iLux, TearCare
- ▶ Meibomian gland probing

Clinical Case 1

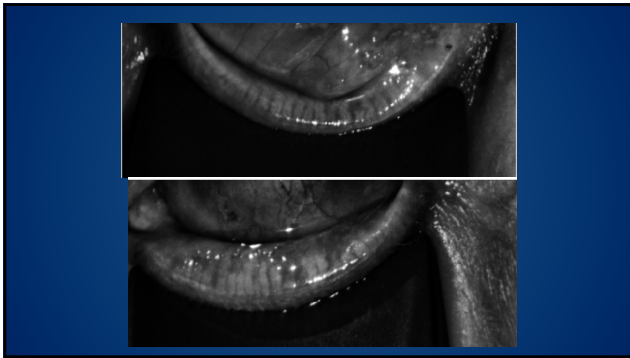
- 69 yo WM, attorney, works part-time
- c/o chronic FBS, redness and discomfort of eyes ou, in the morning and as day progress
- Also has sharp episodic pain overnight and upon awakening
- Wife notices excessive blinking ou for years
- PMHx: HTN
- POChx: no SCL use or prior surgeries

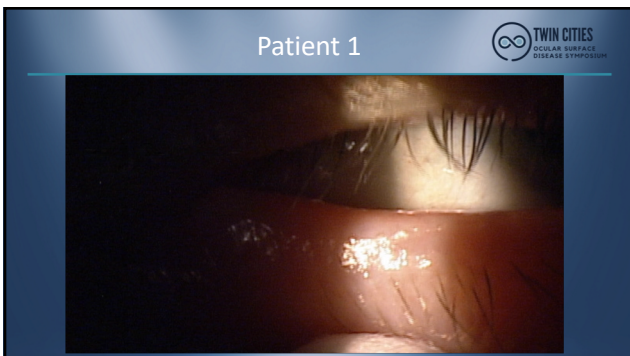
- Erythematous eyelids
- Rhinophyma



Case 1: Clinical Exam Feb 2015

Tear Osm	286 / 302
IFD	Negative ou
Lids	2-3+ telangiectasis
	Easily expressible meibum, mildly turbid
C/S	tr CCH
Cornea	1+ LG staining inferiorly, no NaFL staining





Case 1: Diagnoses

1. Rosacea blepharitis
2. MGD
 - Decent function, moderate architectural damage
3. Essential blepharospasm ou
4. Recurrent Corneal Erosion Syndrome

A blue medical icon of a first aid kit with a white cross is on the left. To its right is the text "Case 1: Diagnoses" followed by a numbered list of four conditions. The list includes "Rosacea blepharitis", "MGD" with a sub-bullet "Decent function, moderate architectural damage", "Essential blepharospasm ou", and "Recurrent Corneal Erosion Syndrome".

Case 1: Treatment

- 1. First, acutely calm the ocular surface and lids down
 - Pres-free dexamethasone 0.01% tid x 2 w
 - Oral doxycycline 20 mg bid
 - Plan to transition to oral omegas
 - Return for thermal pulsation therapy in 2 weeks

Case 1: In follow-up.....

- 6 weeks after thermal pulsation therapy, daytime symptoms are "75% improved", but is still awakened by sharp discomfort overnight
- Lid blinking exercises qhs
- Oral omegas qday
 - NaCl 5% ointment qhs

Case 1: In follow-up.....

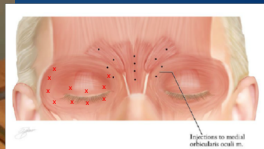
- Blepharospasms unchanged
 - Likely essential blepharospasms, and not secondary to blepharitis
- What treatment options exist for blepharospasms?

Essential Blepharospasms

- Blepharospasms can lead to OSD, worsen QoL
- Blepharospasms can worsen filamentary keratitis
- Botulinum toxin A is a very effective treatment for the temporary treatment of orbicularis spasms, and its sequelae on the ocular surface³
 - HOA, Schirmer I tests, Dry Eye-related Quality of Life Score (DEQS) and Ocular Surface Disease Index (OSDI) scores, TBUT, lissamine green staining have all improved after botulinum toxin^{1,2}

1. Ishiki Y, Ishikawa H, Mimura O, Igarashi J. *Ophthalmol*. 2016 Nov;124(11):486-491.
 2. Kocabeysoglu S, et al. *Eur J Ophthalmol*. 2014 Nov Dec;24(11):2310-4.
 3. Gurusu A, Lee H, Yoo MT, Pflugfelder SC. *Arch Ophthalmol*. 2012 Apr;130(4):446-50.

Botulinum for Essential Blepharospasms



- Inject 1 – 3 units per injection site
 - Apply very close to upper lid margin to avoid levator
- Inject total of 6-12 units per muscle
- Orbicularis: stay very close to lid margin to avoid spread to levator

Botulinum for Dry Eye Disease!



- Botulinum toxin injection into the medial part of eyelid improves dry eye signs and symptoms and reduces tear cytokine levels^{1, 2}
 - TBUT, Schirmer I test, OSDI scores improved
 - Conjunctival and corneal staining improved
- Weaken orbicularis muscle and nasolacrimal pump drainage function

1. Choi MC, et al. *Graefes Arch Clin Exp Ophthalmol*. 2018 Feb;56(2):271-281-288.
 2. Serna Queda JC, et al. *Acta Ophthalmol*. 2017 Mar;95(2):e132-e137.


BACK TO OUR PATIENT.....

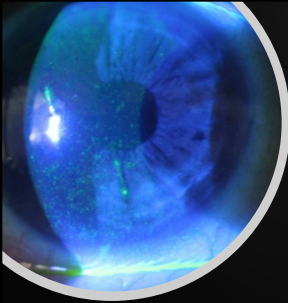
Case 1:
Almost 3 years later...

- Stable MG architecture
- No further loss
- Less overall congestion
- No more RCES

Treatment:

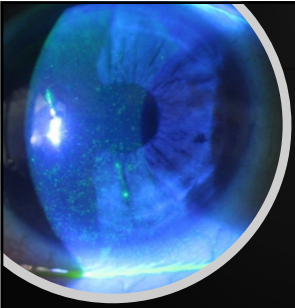
- Thermal pulsation q year
- Oral omegas
- Topical azithromycin every other evening





Filamentary Keratitis: Etiology

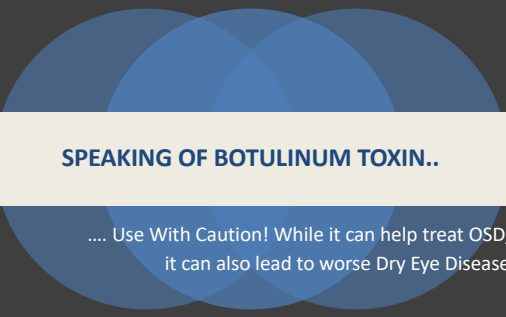
- Severe Dry Eye Disease
- Filaments = mucous plaques
- Exposed surface of superficial corneal epi + excessive, highly viscous mucous + presence of epithelial receptor sites for the plaque elements predispose to this condition
- Mucous viscosity may increase from dehydration, an increase in the sialomucin component, or secondary to staphylococcal infection (which may lyse certain components of mucin)
- Exacerbated by blepharospasms and blepharoptosis



Filamentary Keratitis: Treatment Options

- Aggressive pres-free lubrication, preferably hypotonic and non-viscous
- Mechanical debridement of filaments
- Topical steroids and non-steroidal drops⁶
- Cyclosporine 0.05%¹
- 20% Autologous serum tears²
- 10%-20% N-acetylcysteine 1-4x daily⁷
- Therapeutic bandage contact lens⁴
- Blepharoptosis surgery⁵
- Botulinum toxin³

1. Perry HD et al. Ophthalmology. 2003 Aug;110(8):1578-81
 2. Reed SR, Gohar A, et al. Eye Contact Lens. 2017
 3. Gurnak K, Pflugfelder SC, et al. Arch Ophthalmol. 2012 Apr;130(4):446-50
 4. Tripathi RC, et al. Int Ophthalmol Clin. 1991 Spring
 5. Kinoshita S. Nippon Ganka Gakkaï Zasshi. 2011 Aug;115(8):693-8.
 6. Terry KI, Couring, et al. Clin Ophthalmol. 2014;8:1647-1648.
 7. Abetz J, et al. Optom Vis Sci. 2003 Jun;80(6):420-30



SPEAKING OF BOTULINUM TOXIN..

.... Use With Caution! While it can help treat OSD, it can also lead to worse Dry Eye Disease

Top 10 Cosmetic Contributors to OSD

- Waterproof eye makeup
- Eyelid tattooing
- Eyelash extensions
- Liquid eye make-up removers
- Over-the-counter eyelash growth serums
- Botox for crow's feet
- Botox in a jar (argiriline)
- Retin-A
- Common Ingredients ¹
- Sharing makeup and not replacing products on schedule

1. Perriman LM, O'Dell LE. <https://www.ophthalmologymangement.com/Issues/2016/august-2016/when-beauty-doesn-t-blink...>

BEWARE!

Unfortunately for patients, labels such as “hypoallergenic”, “organic”, “natural” and even ‘ophthalmologist tested’ offer no assurance that these irritating chemicals are not present

Laura Periman, MD

Eyelash Products

- Over-the-counter eyelash growth serums frequently contain synthetic prostaglandins with unusual names such as isopropyl cloprostenate
- Waterproof eye makeup often requires harsh heavily BAK-loaded products
 - BAK concentration often > 1%, which is much higher than Rx eye meds

Permanent Eyelash Extensions

- Often stop cleaning their lash bases, which can lead to blepharitis
- When the lid-length to lash-length ratio is distorted (1:3), it alters the lashes’ natural properties to deflect wind, debris and allergens¹
- Long lashes become aerodynamic, directing more air movement to ocular surface²
- Allergic reaction to adhesives used to attach permanent lashes have been reported
- Formaldehyde laden preservatives in the adhesives leach onto the ocular surface, irritating the corneal nerves at 0.5 ppm and inducing cell death in culture²

1. Presentation at Society for Integrative and Comparative Biology Annual Meeting 2015
2. Chen A, et al. Exp Eye Res. 2018 May;170:188-197

Non-surgical Eyelid Procedures

- Botulinum toxin to lateral rhytids (crow's feet) worsen TBUT and Schirmer's testing¹
- Eyelid tattooing → ink compounds and mechanical trauma involved in eyelid tattooing associated with MGD and tear film instability²

1. Ho M, et al. JAMA Ophthalmol. 2014 Mar;132(3):332-7.
2. Lee YS, et al. Cornea 2012 July;30: 750-755

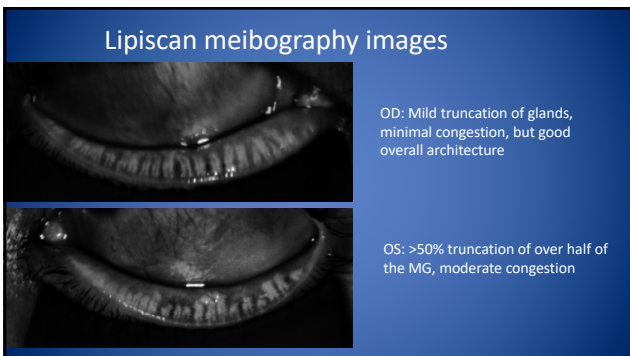
Case 2: LASIK Evaluation

- 32 yo female presents for LASIK evaluation
- HPI:
 - Stopped SCL a year ago, greater discomfort in them
 - Left eye has slowly developed greater FBS, even in glasses alone, over the past year
- PMHx:
 - Healthy
 - Bell's Palsy left side of face, 2007
 - No residual issues
- Meds: multivitamin daily
- MRx: OD -3.50 +0.50 x 090 (20/15)
OS -4.00 +1.50 x 090 (20/15)

Case 1: Anterior Segment Exam

- LLL:
 - Meibum grade 2, easily compressible
 - Blink appears weaker on the left side, no lag with closure
- C/S: WNL
- K: no staining
- AC: D/Q
- I: WNL
- Lens: no cataractous changes
- Shimer's 20 OD/25 OS
- TBUT: 12 sec OD/ 9 sec OS





Case: 2


- Meibomian Gland Dysfunction, left worse than right eyes
 - Greater MG architectural damage of left eye due to weakened blink function
 - Poor blink OS leads to congestion and pressure atrophy of the left eye meibomian glands!
- MGD occurs in younger patients, even adolescents (Gupta PK, et al. Cornea. 2018 Apr;37(4):426-430)
 - Modern risk factors, inc. extended time on digital devices & SCL wear worsen MGD


Case 2


- Prognosis:
 - Good to great
 - Overall, MG architecture very good OD, and at least has plenty functioning OS
 - Patient should respond very well to Lipiflow and oral omegas
 - Annual meibography and Lipiflow should be performed to manage the MGD
 - If no interval worsening of MG architecture occurs in 1 year follow-up, TBUT stable and patient has no corneal staining → then consider LASIK or PRK

**A WEAK EYELID BLINK
CAN WORSEN MGD!**

Conclusion

 Healthy eyelid blink and function play an integral role in ocular surface health

 Look (lashes, lid, interpalpebral conj/cornea)
Lift (upper lid for SLK, superior ABMD)
Pull (upper lid for floppy lids)
Push (lower lid meibomian gland expression)

 Treat eyelid diseases early! Prevent progression.

