Don’t Overlook the Lids

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Function

• The eyelids have 2 main functions:
  – Protection of the globe
  – Secretion, distribution and drainage of tears

Anatomy

Eyelid Layers

• The layers of the eyelid are:
  i) skin
  ii) loose subcutaneous tissue
  iii) muscle layer
  iv) loose connective tissue layer under the muscle
  v) fibrous tissue layer
  vi) smooth muscle layer
  vii) conjunctiva.

Glands in the Eyelids

• The glands of the eyelid are:
  i) meibomian glands – in the tarsal plate. Their secretion forms the oily part of the tear film.
  ii) glands of Zeis – sebaceous glands that open into the follicles of the eyelashes.
  iii) glands of Moll – modified sweat glands that also open into the eyelash follicles.
  iv) glands of Wolfring – these are accessory lacrimal or tear glands.

Disclosure

• Consultant
  – ALCON Vision Care
  – Allergan
  – Novabav
  – Valeant
• President
  – EyePrint Prosthetics

• I have no financial interest in any of the product mentioned in this lecture
Meibomian Gland Evaluation

Issipated  Normal  Blunted

Figure Legend:
Advanced meibomian gland dysfunction: epithelial ridging extending between opacified meibomian gland orifices (courtesy of A. Bron).

Figure Legend:
Cicatricial meibomian gland dysfunction: all meibomian orifices open onto the marginal conjunctiva, with some exposure of terminal ducts (arrows) (courtesy of A. Bron).

Innervation

– upper eyelids
  • infratrochlear, supratrochlear, supraorbital and the lacrimal nerves from the ophthalmic branch (V1) of the trigeminal nerve (CN V).
– The skin of the lower eyelid:
  • infratrochlear at the medial angle
  • the rest is supplied by branches of the infraorbital nerve of the maxillary branch (V2) of the trigeminal nerve.
Position

- When the eye is open, the upper lid covers 1/6 of the cornea and the lower lid should just touch the limbus.
- Enlarged aperture
  - Thyroid eye disease
  - Space occupying lesion

Movement - Vertical

Movement - Horizontal

Lagophthalmos

Innervation

- Marcus-Gunn Jaw Winking
- Aberrant connection of the oculomotor nerve (CN III) fibers that innervate the levator and the trigeminal nerve fibers of the muscles of mastication

Innervation

- 7th Nerve Palsy
  - Bell's Palsy
  - Idiopathic, unilateral
    - Self limiting
    - <1% bilateral
  - DDx
    - Brain tumor
    - Stroke
    - Myasthenia gravis
    - Lyme disease.
  - Inability to close eye

10/6/2016
Innervation

- Inability to Open Lid
  - Horner’s Syndrome
    - Look for small pupil
    - Mild ptosis
    - Impaired innervation of sympathetic to muellers muscle
      - Stroke
      - Aneurysm
      - Tumor

- Myasthenia gravis
  - 20/100,000 people
  - Reduction in acetylcholine receptor sites
  - Common symptoms can include:
    - A drooping eyelid
    - Blurred or double vision
    - Slurred speech
    - Difficulty chewing and swallowing
    - Weakness in the arms and legs
    - Chronic muscle fatigue
    - Difficulty breathing

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Lash Ptosis

- Anatomical changes within the eyelid
  - Orbicularis oculi
  - Riolar muscle
    - Loss of muscle elasticity = loss of follicle support
  - Tarsal plate
    - Deficiency of elastin
- Surgical correction for blepharoptosis

Position

- Ptosis- Congenital
  - Present at birth
    - Gender: males=females
    - Etiology: levator development abnormal
      - Resulting in fibrosis and fatty infiltration of muscle

- Ptosis-Congenital
  - Chin up head position is bilateral
  - Nocturnal lagophthalmos
  - Lid crease poorly formed
  - 16% have abnormal superior rectus function as well
  - Amblyopia concern
    - When to do surgery depends on amblyopia risk
Position

- Ptosis - Acquired
  - Floppy Eye Lid Syndrome
  - GPC
  - Chronic rubbing
  - In obese patients with floppy lids and keratoconus – think Sleep apnea

Floppy Eyelid Syndrome

- Note the lash ptosis OS

Ptosis - Acquired

- Levator dehiscence from contact lens wear
- Aging

Ptosis VF Testing

At least 20 degrees of VF loss for Medicare payment for repair

Ptosis - Acquired

- Neoplastic
- Neurofibromas
- Cicatricial

Position

Entropion

- Symptoms
  - Redness and pain around the eye
  - Sensitivity to light and wind
  - Sagging skin around the eye
  - Epiphora
  - Decreased vision, especially if the cornea is damaged
Position

Entropion

Causes
• Congenital
• Aging creating loose skin and stretched and loose ligaments and muscles.
• Scarring
  – Trauma
  – Trachoma
• Spasm
  – Have patients squeeze lids

Ectropion

Causes
• Muscle weakness.
  – Age
  – Hand can begin to drop and turn outward.
• Facial paralysis.
  – Bell’s Palsy
  – Tumors
• Scars
  – Facial burns
  – Traumatic, dog bite or lacerations
• Eyelid grafts
  –Brings to concurrence
• Blepharoplasty
• Radiation
• Dermatitis
  – can lead to skin reshaping
• Congenital ectropion
  – Down syndrome
  – Steven-Johnson syndrome

Disorders Of the Lashes

Congenital Distichiasis

• Growth of lashes in meibomian glands
  – epithelial germ cells failure to differentiate completely to meibomian glands
• Congenital
  – dominantly inherited with complete penetrance
  – isolated or associated with ptosis, strabismus, congenital heart defect
• Acquired
  – Lower lid
  – Pigmented or non-pigmented
  – Chronic inflammation

Madarosis

– Decrease or loss of lashes
  – Long standing Anterior Blepharitis
  – Tumor
  – Thermal burns
  – Trichotillomania

Madarosis

– Associated Disease
  – Alopecia
    • Hereditary
    • Autoimmune
  – Atopic dermatitis
    • Scratching/rubbing
  – Systemic Lupus
    • Early loss
    • Breakage
    • Scarred follicles
    • Ichthyosis
**Hypertrichosis**
- Excess lashes or abnormally long lashes
  - Congenital
  - Drug induced
    - latanoprost

**Poliosis**
- Premature whitening of the hair, lashes and eyebrows
  - Vitiligo
  - Waardenburg syndrome
    - iris heterochromia
    - White forelock
  - Demodex

**Normal Flora**
- Staphylococcus epidermidis (95.8%)*
- Propronibacterium acnes (92.8%)*
- Corynebacterium sp. (76.8%)*
- Acinetobacter sp. (11.4%)
- Staphylococcus aureus (10.5%)

* More heavily colonized in people with blepharitis

**POST-SURGICAL ENDOPHTHALMITIS DUE TO**
- Normal Bacterial Flora
- MOST COMMON IS COAGULASE (-) STAPHYLOCOCCUS
- INCIDENCE ~ 1 PER 750 SURGERIES
- Increased 2.5 to 6x for Clear Corneal Cataract Extractions

**BABY SHAMPOO NOT ANTIBACTERIAL 10:1 dilution**
- Harsh on tender eyelid skin

**ANTIBACTERIAL SOAPS CONTAIN BAK or EtOH**
- Not good for use around the eye

**Infection**
- Staphylococcal blepharitis
Infection

- Posterior Blepharitis
  - Meibomian Gland Dysfunction

- Angular Blepharitis

- Hordeolum/Chalazion
  - Demodicosis more prevalent than in control group (69.2% vs 20.3%)
  - D Brevis more common than D Folliculorum (2.82:1)
  - 33% recurrence

What is Demodex?

- 8 legged mite which lives in hair follicles and oil glands.
- 65+ species of Demodex,
  - only 2 live on humans (folliculorum and brevis)
  - not the same mites which affect pets.
- spread either through direct contact or in dust and towels containing eggs.
- eat skin cells, hormones and oils in the follicles and glands
- Major cause, if not the cause, of rosacea, seborrheic dermatitis and other skin conditions.


Molluscum Contagiosum

- Age: children/ young adults
- Etiology: viral lesions
  - Contact with others
- Single or multiple
- Pearly white with central keratin plug
- Follicular conjunctivitis
- Regress spontaneously/ frozen

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**Demodex Species**

**Brevis**
- 0.2mm long

**Folliculorum**
- 0.4mm long

**Signs**

**Anterior blepharitis**
- Studies show nearly 100% if people with blepharitis have Demodex
  - Statistically significant correlation
- Cylindrical dandruff
- "volcano-like" lash base
- folliculitis

**Posterior blepharitis**
- MGD
- telangectasia

**Symptom**

**Dry Eye**
- Increased Demodex with increased OSDI
- Normal shirmer’s with mite infestation
- >85% of patients with evaporative dry eye have demodex (MGD)

**Symptoms**

**Allergy**
- Positive correlation to Demodex and conjunctival papillary changes
- Itching
- DR’s and patients often treat for allergies when actually mites
- Mite debris and waste elicit inflammatory response
Associated with other ocular disease states

- Salzmann nodular degeneration
- Ocular rosacea
  - Stem cell failure
- Peripheral ulcers
  - Aka clpu, staph marginal keratitis

Symptoms

1. Dryness
2. Blurred vision
3. Itching
4. FBS/ irritation
5. Glare
6. Crusting, redness
7. Many people have lived with their Demodex symptoms for so long that they consider them normal.

Past History

- Patients may have a history of trying treatments with little to no success
- Drop out of contact lens wear
- Past treatments may include:
  - Artificial tears
  - Cyclosporine
  - Antihistamines
  - Doxycycline/tetracycline
  - Oral
  - Topical
  - Lid hygiene (baby shampoo)
  - Steroids - increases mite counts

How do mites cause symptoms

- Demodex is colonized with bacteria
- Decaying mite bodies elicit inflammation
- Increasing mite counts
- Immune response to mites
- IL-17 tear concentrations higher in demodex colonized patient than non-colonized patients
  - IL-17 causes inflammation of ocular surface and lid margins

Looking for Mites

- Demodex associated with CL drop out/ dry eye
  - May be a major cause!
  - I have successfully treated Demodex and patient regained CL wear
- Confused with seasonal allergy
  - Pt self treating allergy
- Need better treatment/ awareness
  - Cliradex
  - Long time course for improvement- months
  - Need quality patient instructions
- No procedure codes for in office diagnosis or treatment
- Need more studies

Challenges
Treatment

- Nearly impossible to eradicate
- All members of household should be checked
- Heat kills mites in bedding
  - Scrubbing off debris (baby shampoo very bad) helps
  - Tea tree oil?
  - Manuka honey?
  - Colloidal silver?
  - Other Essential oils?
  - Hypochlorous acid?
- High patient compliance once they see their own mites

Treatment

- Ivermectin
  - Antiparastic
  - Paralyzes and kills parasites
  - Oral
    - Single dose 3mg tabs)
    - Based on weight
    - Call pharmacist
  - Topical
    - 1% ivermectin
    - Hard to find for humans.
    - OTC for pets (1.87%)

Treatment skin- not eyes

- Permethrin cream 5%
  - BID
  - More effective the 0.75% metroidazole
  - No eye indication
- Eurax cream (crotamiton) 10%

EyeLid Hygiene

- Reasons not to use baby shampoo
  - Dermatitis
  - Excessive drying
  - Burning
  - Damage lipid layer
  - Does not effect bacterial colinization of eyelids
  - Dermatologists won’t use it on their babies!

Hot Compresses

- Warm compresses applied to the outer lid must maintain a temp of 113°F in order to reach the MG, 4-6 minutes.
- Cornea temperature increases
  - Cornea. 2013 Jul;32(7):e146-9
- Moisture help soften collarettes
- Hot water increases evaporation off periorbital skin
  - Increased drying and discomfort

BlephEx™

- Last 6-8 minutes
- Repeated every 4-6 months
- Cost $130- $250
- S9986 (not medically necessary- pt aware)
Current Lid & Lash Cleansers

- **Main function is to act as a "detergent", removing debris from the lids and lashes**
- **Current formulations contain many, extraneous ingredients**
  - Such as surfactants, buffers and wetting agents

Sterilid

- **Linalool**
- A Liquid distilled
  - from oils of flowers, spice plants, tea trees.
  - pleasant floral scent and anti-microbial.
- **Effective against Pseudomonas**

Ocusoft

- **OcuSOFT Lid Scrub**
  - Original is recommended for routine daily eyelid hygiene
- **OcuSOFT Lid Scrub PLUS**
  - is an extra strength, leave-on formula recommended for moderate to severe conditions with bacterial involvement.

Cleansing Oils

- **Reduce surfactant induced skin irritation**
  - Polar oils bond with proteins and protect skin
  - Sunflower oil better than mineral oil
  - *Int J Cosmet Sci*, 2015 Feb
- **Coconut oil has higher saponification**
- **Improved epidermal barrier loss and cutaneous inflammation**
  - *Int J Dermatol*, 2014 Jan
Coconut oil

- Coconut oil is a polar oil
- Antibacterial
  - Changes bacterial cell membrane activity
  - *J Med Food.* 2013 Dec;16(12):1079-85
- Anti- candida
- Lowers lipid peroxide levels
- Antioxidant
  - *Skin Pharmacol Physiol.* 2010;23(6):290-7

Coconut oil regime

- Apply small amount to lid margin
- Let soak in about 20 minute
  - Brush teeth
  - Get in jammies
  - Etc...
- Wipe off with dry wash cloth or gauze pad
  - Apply firm but not excessive pressure

- If patient complains of lingering blurred vision: used too much

Coconut oil

- Clinically: what I have found
- Adds oil to the tear film
  - Severe evap dry eye patients report improved comfort while using it
- No need to hot soaks to remove scurf
- Reduced collarettes
- Reduced lid inflammation
- Better long term compliance

Coconut oil scrubs

Before After 1 month of treatment

Before After 1 month of treatment
**Tea Tree Oil**
- Tea tree treatments with 50% lid scrubs in office
- 5-15% TTO at home
- Multiple Properties
  - Anti-microbial
  - Anti-inflammatory
  - Anti-protozoal
  - Anti-viral
- Toxic to the Ocular surface!

**Cliradex**
- Melaleuca alternifolia
  - a special variety of tea tree oil
- Preservative free

**Manuka honey**
- Made in New Zealand by bees that pollinate the native manuka bush.
- UMF (Unique Manuka Factor) determines antibiotic effectiveness.
- Manuka honey used is pharmaceutical/medical grade and highly sterilized.

**Manuka Honey**
- principle antibacterial components
  - methylglyoxal and hydrogen peroxide

**Betadine**
- Betadine 5% Ophthalmic Prep Solution
  - Povidone-iodine
- Normal surgical scrub is 10%
- Intended for:
  - Irrigation of cornea, conj.
  - Periocular antiseptic
- Wide range of bacteria
  - Effective against biofilm
  - Inhibits release of exotoxins
- Possible Treatment for EKC

**Hypochlorous Acid .01%**
- Excellent activity against a broad range of pathogens
- Fast acting onset of activity
- Effective against pathogens commonly found on the lids & lashes

<table>
<thead>
<tr>
<th>Bacteria (ATCC number)</th>
<th>Time to Kill</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aspergillus brasiliensis 5504</td>
<td>30 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Candida albicans 10201</td>
<td>30 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Chromobacterium violaceum 12482</td>
<td>30 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Citrobacter freundii 2122</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Enterobacter aerogenes 13082</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Enterococcus faecalis 51291</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Klebsiella pneumoniae 13008</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa 27853</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
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<tr>
<td>Pseudomonas aeruginosa PA01</td>
<td>60 seconds</td>
<td>&gt;99.999%</td>
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<tr>
<td>Staphylococcus aureus (ATCC 6538)</td>
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<td>Staphylococcus epidermidis 12328</td>
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<td>Staphylococcus xylosus 31552</td>
<td>30 seconds</td>
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</tr>
<tr>
<td>Staphylococcus capitis 31562</td>
<td>30 seconds</td>
<td>&gt;99.999%</td>
</tr>
</tbody>
</table>

*Data on file*
Lipiflow/Tearscience

• “A revolutionary way to treat evaporative dry eye caused by meibomian gland dysfunction.”

• Controlled heat and massage for optimized stimulation of the meibomian glands.

Papilloma

• Age: middle age/ elderly
• Etiology
  – Viral: HPV
  – Non-viral: UV light
• Skin:
  – Soft
  – Skin colored, tan or brown
  – Round oval or pedunculated
  – Treatment: excision
• Conjunctival
  – Differential from Squamous cell Carcinoma
  – Treatment: Steroid, 40% recur

Actinic Keratosis

• Age: rare under 30
• Etiology
  – Presumed sun exposer
  – Generally multiple
  – Most common on face, trunk and upper extremities
• 20% risk of progression to squamous cell carcinoma
• Lesion start flat, light tan
  – Become pigmented, elevated and warty over time
• Treatment
  – Biopsy/excision/ cautery

Epidermal Inclusion Cysts

• Age: Any
• Males= females
• Smooth round elevated cysts filled with keratin
• Arising from follicles
• Ablation of entire cyst walls necessary for eradication

Sebaceous Cyst

• Clinically look like epidermal inclusion cysts
• Blocked glands of Zeiss, meibomian or sebaceous
• Filled with epithelial cells, keratin, fat and cholesterol crystals
• Surgical excision
Eyelid Nevus

- Acquired
  - Begins in childhood
    - Basal epithelium migrates to the dermis surface
  - Deeply pigmented to amelanotic
  - Flat or pedunculated
  - No lash loss
  - 5% malignant transformation
  - Photodocument

Sebaceous Cell Carcinoma

- Clinical Features
  - Solitary lid lesion
  - Diffuse lid thickening
  - Loss of lashes
  - Lesion visible through tarsal conjunctiva
  - Zeis gland- lid margin
  - MG- deep in tarsus

Basal Cell

- Pearly, waxy, translucent
  - Rolled boarder
- Telangiectasia near borders
- Loss of lashes
- Tumor extensions possible but no distant mets
- Mortality <1%

Tumor

- Sebaceous Cell
  - Arise from glands of Zeis
  - 2-7% of malignant eyelid tumors
- Diagnosis
  - Recurrent chalazion
  - Chronic meibomitis
  - Blepharoconjunctivitis
- Aggressive
  - Orbital extension (17%)
  - Systemic mets (8%)

Tumor

- Basal Cell
  - Most common tumor of the skin
    - Sunlight exposure
    - demodex
  - >400,000 people treated annually in US
  - 65% lower lid
  - 15% medial canthus
  - 15% upper lid
  - 5% lateral canthus

Tumor

- Primary Malignant Melanoma
  - Sun exposed areas
  - Primary lesion or met
  - 1% of malignant eyelid tumors
  - Variable pigment mass
    - Can bleed or ulcerate
    - Check fornixes
  - Histopath proven
  - Prognosis depends on mets
Both patients shown above presented with unilateral, pigmented lesions of the upper eyelid. The patient on the left noticed the lesion slowly progressing over the last 4-5 months; the patient on the right was referred by her primary care physician due to her “suspicious bruise”.

1. What common historical element might be anticipated in both of these patients?
   a. Injections of BOTOX™ for cosmetic enhancement
   b. Atopic dermatitis with eczema
   c. Chronic or excessive exposure to ultraviolet radiation
   d. Elevated serum cholesterol and lipids

1. The patient on the left is a 68-year-old woman who vacations frequently in South Florida, where she is an avid golfer and boater. She has noticed the lesion on her left upper lid developing over the last year. Upon inspection, you find similar, smaller lesions on her hands, scalp and ears. What is the LEAST likely presumptive diagnosis?
   a. Actinic keratosis
   b. Basal cell carcinoma
   c. Sebaceous cell carcinoma
   d. Seborrheic keratosis

1. The patient on the right is an 88-year-old white female who lives in the mid-western United States. She has advanced Alzheimer’s disease and cannot give an accurate history. A family member claims that the “bruise” on her upper lid was noticed about 2 weeks ago without any known trauma. Which of the following is NOT a red flag for potential malignancy?
   a. Associated madarosis
   b. Non-uniform color and shape
   c. Location on the upper eyelid
   d. A satellite lesion at the outer canthus

Thank You

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