

Advances in OSD: Treating Dry Eye

Marc Bloomenstein OD FAAO
 Paul Karpecki OD FAAO
 Jack Schaeffer OD FAAO
 Laura Periman MD disclosures

1



- Aerie, Akorn, Alcon, Allergan, Akorn, Anthem, Avellino, Bausch, Beaver Visitech, BioTissue, BlephEx, Bruder, Cambium Pharma, DGH Technology, eyeBrain, Essilor, Eyegate, EyeVance, Focus Labs, iCare USA, Imprimis, Ivantis, Jobson Healthcare, Johnson & Johnson Vision, Konan, Medical, LensTech, MacuHealth, Maculogix, Notal Vision, Oasis Medial, Ocular Sciences, Oculus, OcuSoft, Optometric Medical Solutions, Oyster Point Medical, PECAA, Quark Pharmaceuticals, Refocus, Reichert, Rendia, RxSight, Science Based Health, Sentiss Pharmaceuticals, Shire Pharmaceuticals, Sight Sciences, Silk Technologies, Sun Pharmaceuticals, Tarsus Medical, Tearfilm Innovations, TearLab, Topcon, Visant Medical, Visiometrics, Visionix, VitalTears, VMax, Zeiss

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 DR. JACK L. SCHAEFFER

I HAVE RECEIVED HAVE RECEIVED COMPENSATION OR BENEFIT FROM PROVIDER TO THE FOLLOWING COMPANIES:

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- AIC/C/Ox
- ATON
- BAUSCH AND LOMB
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- CLEARPATH
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- MICROFLOW
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- OPTIVUE
- OPTOS
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- VISTAKON
- ZEISS VISION

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I have no direct financial interest in any company or product that is mentioned in this form.

I am on the speaker panel for:

- Alcon
- Allergan
- Alcon Medical Optics
- Bausch + Lomb
- BTI
- TearLab

I am a consultant for:

- Allergan
- Alcon Medical Optics
- Bausch + Lomb
- Essilor
- Optical
- TearLab

Marc R. Blumenthal OD, FAO

4

- Laura Periman MD disclosures

5

6

Objectives

- To establish a foundational knowledge of the evolution of dry eye disease as it is defined
- To describe diagnostic testing and how it can be clinically applied
- To provide insight into current and emerging treatment modalities for ocular surface disease
- To illustrate the advantages of proper use of diagnostics and therapeutics through case study
- To demonstrate the importance of evidence-based practice of optometry in the management of dry eye disease

7

- Laura Periman MD disclosures

8

9

DEWS

- Dry eye is a *multifactorial disease* of the tears and ocular surface that results in symptoms of *discomfort, visual disturbance, and tear film instability* with potential damage to the ocular surface. It is accompanied by *increased osmolarity* of the tear film and *inflammation* of the ocular surface.

10

Dry Eye is a **multifactorial** disease of the ocular surface characterized by a loss of homeostasis of the tear film, and accompanied by ocular **symptoms**, in which **tear film instability** and **hyperosmolarity**, ocular surface **inflammation** and **damage**, and **neurosensory abnormalities** play etiologic roles.

—The Definition and Classification of Dry Eye Disease, DEWS II, TFOS 2017

11

Dry Eye is a multifactorial disease of the ocular surface characterized by a loss of **homeostasis** of the tear film, and accompanied by ocular symptoms, in which tear film instability and hyperosmolarity, ocular surface inflammation and damage, and **neurosensory abnormalities** play etiologic roles.

—The Definition and Classification of Dry Eye Disease, DEWS II, TFOS 2017

12

Dry eye is not just a
disease,
it's a complex, multi-
factorial disorder.

13

Dry Eye /Ocular Surface Disease

14

Dry Eye /Ocular Surface Disease

- Medical Ocular condition or disease
- Ocular manifestation of a systemic problem
- Ocular complication from a medical Treatment

15

Dry Eye /Ocular Surface Disease

- WHY IS THIS IMPORTANT

16

Dry Eye /Ocular Surface Disease

- What Systemic Diseases, Medical and Surgical procedures and Medical Complications effect

Ocular **Homeostasis**

17

Dry Eye /Ocular Surface Disease

- Diabetes
- Thyroid Disease
- Autoimmune disease
- Hormonal changes
- Botox and Filler procedures
- Facial plastic procedures
- Graft VS Host disease (cancer Tx complications)

18

Dry Eye /Ocular Surface Disease

- Endocrinology
- Dermatology
- Facial Plastics
- Rheumatologist

19

Dry Eye /Ocular Surface Disease

- Typical MD to MD referral
 - Restasis bid
 - See you in 3 months
 - Or)

20

Dry Eye /Ocular Surface Disease

- I just bought a Lipiflow and you need this procedure today
- And here is Rx for restasis
- See you in 6 months and OH my goodness

21

Dry Eye /Ocular Surface Disease

- I just read about this new IPL treatment so be sure to stay in touch so as soon as I purchase one it will be marketed as my treatment of choice
- Here is a coupon for your first treatment when I learn how to do it!!!
- Oh there is no monetary amount on the coupon , it is just to let you know that I am a dry eye specialist

22

Dry Eye /Ocular Surface Disease

- The future of the new dry eye treatment medical model
 - Typical Third party managed practice
 - Cash only fee for service model
- Cash only OSD practice
- Can you really do this ??

23

Dry Eye /Ocular Surface Disease

- Are you going to fall into the trap or
- Will you excel and deliver a real solution for the patient
- There are no cookbook treatments for Dry EYE

24

Diagnosis

- **Classification of Dry Eye Disease (DED)**
 - Begin with assessment of symptoms
 - Review for signs of Ocular Surface Disease

ELSVIER The Ocular Surface 2017, 15, 276-282(2017) 15(10)146(jan.2017) 06.006

25

DED Surveys

- **Validated Surveys:**
 - Ocular Surface Disease Index (OSDI)
 - SPEED test
 - SANDE survey
- **Additional Options:**
 - **Dry Eye Summit Questions (2014)**
 1. Do your eyes ever feel dry or uncomfortable?
 2. Are you bothered by changes in your vision throughout the day?
 3. Are you ever bothered by red eyes?
 4. Do you ever use or feel the need to use drops?

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26

Diagnosis

- **Symptomatic patients without demonstrable clinical signs do not** fall into the DED group, but are differentiated into:
 - Pre-clinical dry eye, or
 - Neuropathic pain (non-ocular surface disease)
- **Asymptomatic patients** exhibiting signs are differentiated into patients with:
 - Poor corneal sensitivity, or
 - Prodromal signs, who are at risk of developing manifest DED with time or provocation

ELSVIER The Ocular Surface 2017, 15, 276-282(2017) 15(10)146(jan.2017) 06.006

27

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28


Physical Examination

- Visual acuity
 - Intermittent blur
- Slit lamp exam
 - Lid telangiectasias
 - Incomplete closure
 - Blepharitis/Demodocosis
 - Decreased tear meniscus height
 - Meibomian gland inspissation
 - Poor tear film quality
 - Lid Wiper Epitheliopathy
 - Conjunctival and/or corneal staining



29

Which dyes do you routinely use when examining a DED patient?

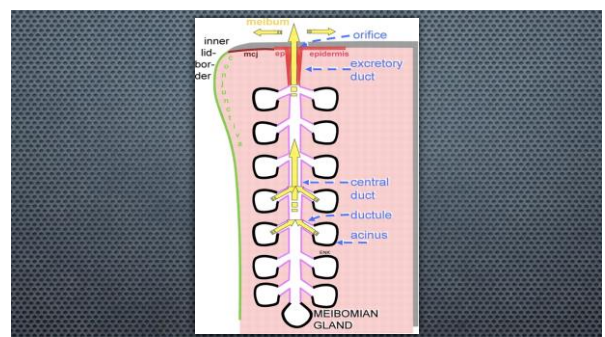


30

Point-of-Care Testing

- Matrix-Metalloproteinase-9 (MMP-9)
- Osmolarity
- Meibography
- Tear Volume (Schirmer's Testing or Phenol Red Thread)
- Interferometry
- Blink rate measurement
- Lipid layer thickness (LLT) assessment

31



32

Meibomian Gland – PATHOLOGY

- Obstructive MGD leads to a progressive ductal DILATATION and acinar ATROPHY

From Krupin D & Wong M. Meibomian Gland. In: In: Cornea: Clinical Investigation in the Management of Dry Eye (MGD). [Ophthalmology (Krupin)]

33

Aqueous Volume

Schirmer's Testing	Phenol Red Thread
<ul style="list-style-type: none"> Requires anesthesia 5 minute testing time Mildly irritating Normal results: > 10mm 	<ul style="list-style-type: none"> No anesthesia required 15 seconds testing time Little discomfort Normal results: > 20mm

34

Categories of DED

Aqueous deficient Dry eye	Evaporative Dry eye
<ul style="list-style-type: none"> Describes conditions affecting: <ul style="list-style-type: none"> Lacrimal gland function 	<ul style="list-style-type: none"> Recognized to include: <ul style="list-style-type: none"> Lid-related causes <ul style="list-style-type: none"> MGD Blink-related Ocular surface- related causes <ul style="list-style-type: none"> Mucin Contact lens-related

35


Categories of DED

14-16% of DED = ADDE 86% of DED = EDE


2 Categories of DED, not mutually exclusive:

- Aqueous deficient dry eye (ADDE)
- Evaporative dry eye (EDE)


36



If DED is on continuum, do doctors need to differentiate which subset (ADDE or EDE) is present?



37




Artificial Tears

Aqueous Supplementation


- Viscosity enhancing agents
- Carboxymethyl Cellulose (CMC)
- Hydroxypropyl Cellulose (HPMC)
- Hyaluronic Acid (HA)
- Combined CMC and HA
- Hydroxypropyl Cellulose
- Hydroxypropyl-Guar (HP-Guar)
- HP-Guar + HA
- Osmotic agents
- Osmoprotectants
- Antioxidants
- Preservatives/inactive ingredients/electrolytes

Lipid Supplementation

- Emulsions:
 - Macro
 - Nano
 - Micro



38



Artificial Tears

Biological Tear Substitutes

- Autologous tear substitutes
- Adult allogenic serum
- Umbilical cord serum
- Platelet preparations

Other Agents

- Mucolytic agents
- TRPV1 receptor antagonist



39



Do you recommend a specific type artificial tear to your patients?



40

Aqueous Volume

- **Indications:**
 - Symptomatic contact lens wear
 - Dry eye related to refractive surgery
 - ADDE
 - Dry eye associated with a rapid TBUT
 - Systemic medications that reduce tear film production
 - Superior limbic keratoconjunctivitis (SLK)
 - Corneal irregularities or scarring that affect tear stability
 - Lid palsy or lid closure abnormalities
 - Toxic epitheliopathy
- **Contraindications:**
 - Presence of ocular surface inflammation could prolong the presence of pro-inflammatory cytokines
 - A recent study showed that punctal occlusion resulted in:
 - ↓ corneal fluorescein staining
 - ↓ symptom scores
 - With no elevation of cytokine or matrix metalloproteinase (MMP)-9 levels

41

Who is a good candidate for an punctal plug?




42


Specialty Instrument Offering

BRUDER Surgical Instrument Line


Item #98650 BRUDER Epilation Forceps
These forceps feature non-slip jaws/tips and an easy-grip, no slip handle for precise eyelash removal. German stainless.




Item #98651 KARPECKI Punctal Plug Forceps
This instrument has a groove on the inside tip to hold the plug solidly in place during the procedure. Also if necessary the instrument can be turned 90 degrees to a flat side to push the plug into place. German stainless.



Item #98652 KARPECKI Bandage Lens Forceps
This instrument has a narrow, but rounded tip. The application of a special coating instead of serration assures the bandage will not slip when being removed. Slide the forceps under the edge of the bandage lens and easily pick it off the eye. German stainless.



Item #98653 KARPECKI Debrider
The instrument has a slightly curved tip with a "crisp" edge on both sides. The edge is just right to remove the keratin easily by sliding the instrument, curve forward, along the eyelid in a single direction. German stainless.




43

Punctal Plugs

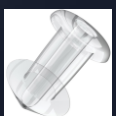
Absorbable Plugs

- Temporary inserts
- Collagen-based plugs
- Absorb in 1- 16 week




Non-Absorbable

- "Permanent" plugs
- Often silicone-based
- Types:
 - Freeman
 - Herrick
 - SmartPlug™
 - FORMFIT®




44



Surgical Options

- Permanent surgical closure of the punctum is typically reserved for patients who are:
 - Unable to retain
 - Tolerate punctal plugs
- A wide variety of surgical methods exist including:
 - Total or partial thermal cauterization
 - Punctal occlusion with a conjunctival flap or graft
 - Punctal plug suturing
 - Total destruction (extirpation) of the canaliculus and canalicular ligation


45



Moisture Chamber

- *Slowing evaporation* of the tears, by providing a humid environment and minimizing airflow over the ocular surface
- A number of such devices are available
- Locally-placed humidifying devices have also been proposed to enhance humidity or local air quality

46




Tear Stimulation

Neuromodulation

- Neuromodulation is a therapeutic strategy that involves interfacing directly with the nervous system through:
 - Electrical
 - Electromagnetic
 - Chemical
 - Optogenetic methodologies
- The goal is the long-term activation, inhibition, modification, and/or regulation of neural input to correct organ or tissue dysfunction and manage disease symptoms.

47



Tear Stimulation

Neuromodulation

- **TrueTear™ Intranasal Tear Neurostimulator** (Allergan, Parkway Parsippany, NJ, USA)
 - Two pronged disposable hydrogel tip
 - Handheld device
 - Charging base
- The intranasal tear neurostimulator allows self-delivery of minute electrical currents to the anterior ethmoidal nerve

48

Lid Abnormalities

- Anterior blepharitis
 - Lid wipes
 - Baby shampoo
- Bacterial overload
 - Antibiotic ointments/drops – Short course
 - Macrolide
- Demodex
 - Topical 2% metronidazole gel
 - 1% mercury oxide ointment
 - 4% pilocarpine gel
 - Topical products containing tea-tree oil
 - Oral ivermectin

49

MGD

Ocular lubricants

- As MGD results in ↓ lipid layer thickness, it may be beneficial to replace the lipids with ocular lubricant eye drops or sprays that contain lipids
- A number of studies have found an improvement in signs and symptoms with the use of lipid-based drops
- To enhance the potential performance of lipid-based drops, **nanotechnology** concepts have been incorporated into lipid emulsion eye drops


Warm compress

- Despite the proven efficacy of warm compresses in many clinical studies, **compliance** is often poor due to the time required and the difficulty in maintaining the temperature of the compress for an extended period of time
- Several commercially available products
- Bundle method

50

MGD (Physical)


- Forceful expression
- Thermal pulsation
- Intense Pulse Light
- Intraductal probing
- Debridement scaling
- Blink assessment
- Treatment of corneal exposure
- Soft (bandage) contact lens
- Scleral contact lens



51

Anti-inflammatories

- Glucocorticoids
- Non-glucocorticoid immunomodulators
 - Cyclosporine A ophthalmic emulsion, 0.05%
 - Cyclosporine A ophthalmic solution, 0.09%
 - Cyclosporine 0.1%/Chondroitin Sulfate ophthalmic emulsion
 - Tacrolimus




52



Where do steroids fit into your dry eye treatment?




53



LFA-1 Antagonist

- Lifitegrast ophthalmic solution, 5.0%
 - Small molecule integrin antagonist
 - Engineered to mimic ICAM-1's binding domain to LFA-1
 - Believed to act as a competitive antagonist to block binding of LFA-1 and ICAM-1
 - Resulting in inhibition of T-cell activation, migration, cytokine release and reduction in further T-cell recruitment



54



Other Treatments

- Inflammatory modulation with systemic and topical antibiotics
- Macrolide therapy
- Tarsorrhaphy
- Surgical treatment for conjunctivochalasis
- Essential blepharospasm treatment with botulinum neurotoxin
- Lid corrections
- Dietary modifications
- General hydration state
- Essential Fatty Acids
- Local environmental factors
- Herbal remedies
- Honey
- Milk
- Acupuncture

55



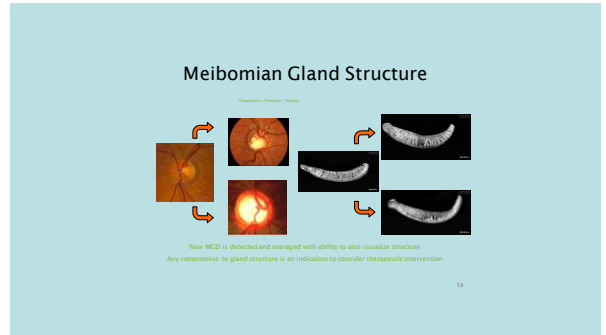
Do you recommend any homeopathic products?



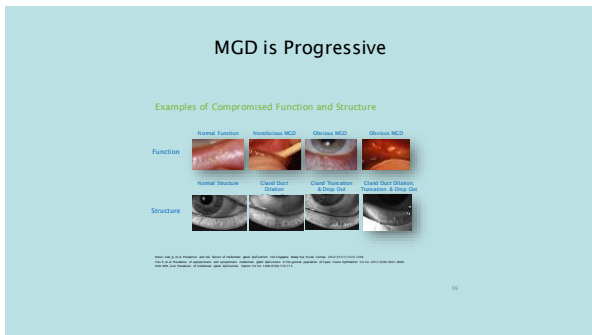
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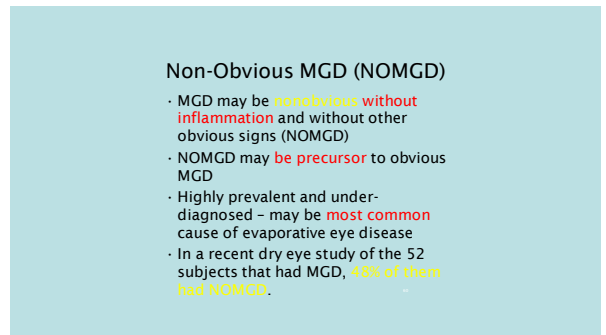
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58



59



60

MGD : What is base cause

- OBSTRUCTION
 - OR
- INFLAMMATION

61

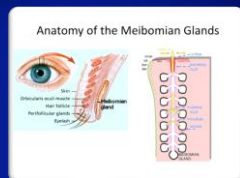
MGD Defined

Meibomian gland dysfunction (MGD) is a chronic, diffuse abnormality of the meibomian glands, commonly characterized by terminal duct obstruction and/or qualitative/quantitative changes in the glandular secretion. It may result in alteration of the tear film, symptoms of eye irritation, clinically apparent inflammation, and ocular surface disease

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62

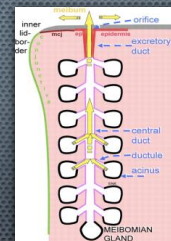
Meibomian Gland Anatomy



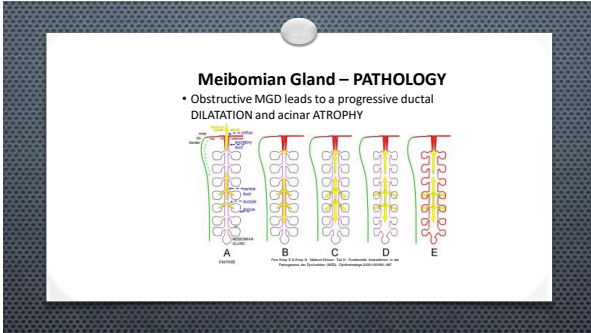
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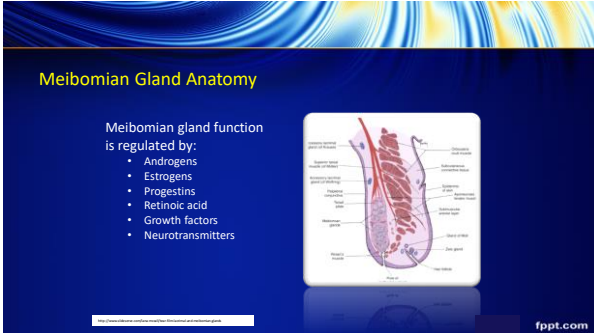
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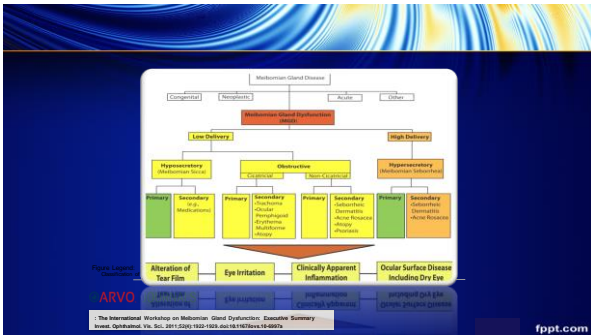
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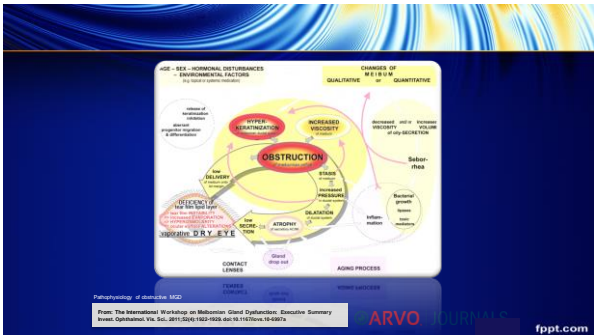
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66



67



68

MGD
What are the early signs
What are the structural
changes expected

69



70

Diagnostics for MGD

Function	
Normal Function	Oblivious MGD

Structure	
Normal Structure	Drop out & duct dilation



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71

Diagnostics for MGD

PROACTIVE CARE	REACTIVE CARE
	

Duct dilation, atrophy and dropout Severe atrophy and dropout

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72

Treating MGD

- Manual expression
- Thermal pulsation
- Intense Pulse Light
- Intraductal probing
- Debridement scaling
- Blink exercises
- Treatment of corneal exposure
- Soft (bandage) contact lens
- Scleral contact lens



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73

Debridement Scaling

Options for debridement:

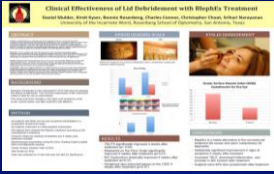
- Lid hygiene products
- Scaling tools at slit lamp
- Microblepharoxfoliation

Bacteria that attach to tissue surfaces can aggregate in a hydrated polymeric matrix of their own synthesis to form a **biofilm**. Leading to bacterial overgrowth leads to a phenomenon known as quorum-sensing. Quorum-sensing is in turn responsible for the production of *pro-inflammatory mediators, cytokines, and proteases, as well as the attraction of neutrophils*

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74

Debridement scaling



- Single-center, prospective, interventional 4-week clinical trial
- 20 subjects with MGD
 - Evaluated at baseline using OSDI, TBUT, and slit lamp grading score for blepharitis and MGD severity
- Underwent a single BiotinEx treatment to all four lids
- Results at 4 weeks:
 - Mean OSDI decreased by 50%
 - Mean TBUT increased by 50%
 - Mean blepharitis severity and MGD severity both decreased by 54%, respectively

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75

Manual expression



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76

Thermal expression

- TearCare
- iLux
- LipiFlow

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77

Thermal expression



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78

Thermal expression

TearCare Pilot Study

Initial 6-month data published in Clinical Ophthalmology, April 2018

Purpose: Preliminary Assessment of the Long-Term Safety & Effectiveness of the TearCare System in the Treatment of the Signs & Symptoms of Dry Eye Disease

- Single Center, prospective, randomized, controlled trial
- 24 Subjects followed for 6 months
 - 12 TearCare subjects
 - 12 Warm Compress subjects (5 minutes daily for 1 month)
- All 12 original TearCare subjects were re-treated at 7 months and followed for another 6 months

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79

MiBoFlo

Treatment 108 degrees
 Initial: 12 min/lid
 1 week: 10 min/lid
 2 weeks: 8 min/lid
 Dual eye pad cuts time
 in half



80

Thermal expression

- Magnifier allows for visualization of glands during treatment
- Warms the eyelid tissue within a therapeutic target
- Applies compression to express meibum
- Amount of heat and pressure control of the user



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81

Thermal expression

iLux Device Delivers Efficacy and Showed Non-Inferiority of MGD Treatment Relative To LipiFlow¹

Purpose: To compare the changes in Meibomian gland function and evaporative dry eye (EDE) symptoms after treatment with iLux and LipiFlow

- Randomized, open-label, multisite clinical trial that enrolled 142 subjects from 8 study sites.
- Subjects were randomized for bilateral treatment in a 1:1 ratio between the iLux[®] treatment group and the LipiFlow group.
- Primary and secondary efficacy endpoints were assessed at baseline and 2 and 4 weeks post-treatment.




Hester DT, Schwab JJ, Oskier JD, et al. Comparison of a Handheld Infrared Heating and Compression Device for Treatment of Meibomian Gland Dysfunction to a Thermal Pulsation Device. Presented at the Annual Meeting of the American Society of Cataract and Refractive Surgery (ASCRS), April 13-17, 2016, Washington, D.C.

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82

Vectored thermal pulsation

- LipiFlow provides an automated 12-minute in-office procedure.¹
- LipiFlow liquefies obstructed meibum and pushes it up and out of the gland orifices
- Heat and pressure LipiFlow applies to the glands are regulated by redundant sensors



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83

Vector Thermal Pulse Technology

A break-through inner lid approach

Safe, effective, precise, proven

- Restores Meibomian Gland Function
- FDA-cleared and clinically approved
- Applies a combination of heat and pressure directly to the inner eyelid
- Independent proven results in peer-reviewed studies^{1,2}

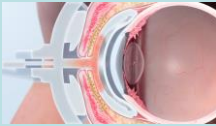


Vector Thermal Pulse Technology (VTP) is a safe, effective, precise, proven approach to restoring Meibomian Gland Function. VTP is FDA-cleared and clinically approved. VTP applies a combination of heat and pressure directly to the inner eyelid. Independent proven results in peer-reviewed studies^{1,2}.

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84

LipiFlow® Thermal Pulsation



LipiFlow® is the only FDA-cleared device for Meibomian Gland Dysfunction (MGD), shown to restore gland function.

LipiFlow® is an in-office procedure, taking only 12 minutes per eye.

85

Intense Pulse Light

- Non-laser high intensity light source
- High-output flashlamp to produce broad wavelength of non-coherent light
- Light pulse produced by electrical current passing through a xenon gas-filled chamber
- Energy pulse goes through a sapphire or quartz block
- Operator controls: duration, intensity and spectral distribution

86

Intense Pulse Light

Analysis of Cytokine Levels in Tears and Clinical Correlations After Intense Pulsed Light Treating Meibomian Gland Dysfunction

Purpose: To investigate the change from baseline of inflammatory markers in tears of dry eye disease (DED) subjects owing to MGD after IPL and MG expression compared to sham and correlations with OSD parameters

All of the inflammatory markers declined in value compared to baselines.

- IL-17A and IL-6 showed statistically significant decreases
- PGE2 showed statistically significant decreases compared to sham at week 12
- The study results suggest that IPL can significantly reduce inflammatory markers in tears of patients suffering with DED owing to MGD after IPL treatment

Analysis of Cytokine Levels in Tears and Clinical Correlations After Intense Pulsed Light Treating Meibomian Gland Dysfunction: Investigating the Effect of Intense Pulsed Light on Tear Cytokine Levels and Meibomian Gland Function. *Investigative Ophthalmology and Visual Science*, 2017, Page 8230

87

Intense Pulse Light

Purpose: Prospective evaluation of intense pulsed light and meibomian gland expression efficacy on relieving signs and symptoms of dry eye disease due to meibomian gland dysfunction

Purpose: Estimate the efficacy of intense pulsed light (IPL), followed by meibomian gland expression (MGX), for reducing the number and severity of signs and symptoms of dry eye disease (DED) secondary to meibomian gland dysfunction (MGD).

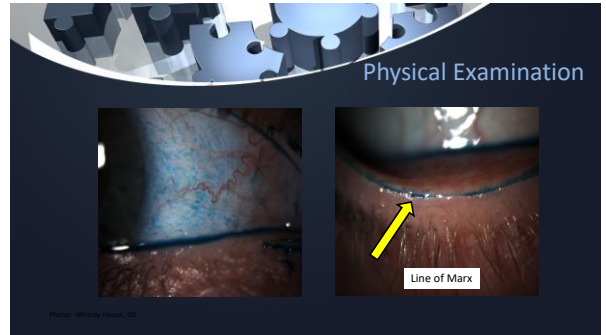
- 40 subjects (80 eyes) with moderate to severe MGD
- Enrolled patients underwent four treatment sessions, 3 weeks apart. Each treatment included the administration of 10–15 pulses of IPL on the cheeks and nose, followed by MGX of the upper and lower eyelids.
- TBUT, MGS, CFS, SPEED, TFD, and lipid layer thickness (LLT) were measured at baseline (BL) and at 9, 12, and 15 weeks after BL

Prospective evaluation of intense pulsed light and meibomian gland expression efficacy on relieving signs and symptoms of dry eye disease due to meibomian gland dysfunction. *Stavouli C, Li L, Borzelle G, Shtein C, Barbaux L, and Derek N. Cornea*

88



89



90

16 M

LID WIPER EPITHELIOPATHY DEFINED

*LWE is any compromise
of the squamous epithelial cells
or the protective coatings
of the Lid Wiper*

A cascade of sequelae will follow

91

THE LID WIPER DEFINED ©

That aspect of the marginal conjunctiva of the upper eyelid that wipes the ocular surfaces

Ocular surface

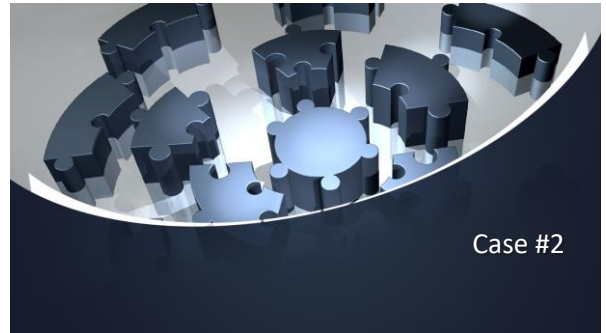
LID WIPER

Korb et al., 2002-2005

92



93



94

Case History

- 58 y.o. Caucasian female
- CC: F.B. sensation & Epiphora
- Slight blur (20/20 -2)
- Slight redness

Courtesy of Paul Karpecki, OD, FAAO

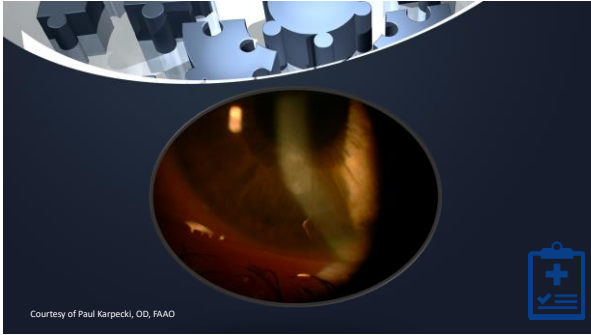
95

Epiphora

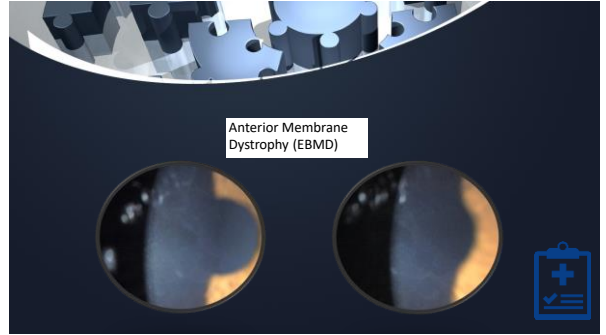
- SLEx finding
- Conjunctivochalasis
- Trichiasis
- Foreign body etc
- Nasolacrimal sac obstruction
- Lid Laxity conditions- ectropion
- Dry Eye

Courtesy of Paul Karpecki, OD, FAAO

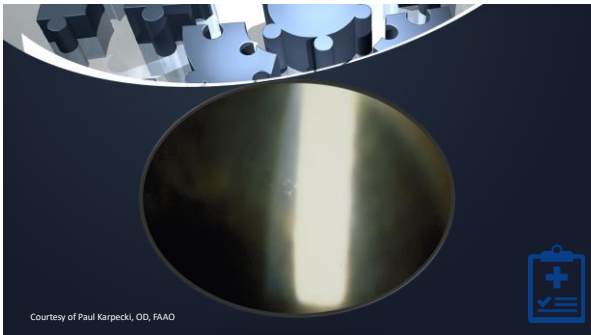
96



97



98



99



100

87% of all RCE occurs in what part of the cornea?

Inferior cornea

Courtesy of Paul Karpecki, OD, FFAO

Reidy JJ, Pauli NP et al. Cornea 2000 Nov.

101

Initial Treatments

- Hyperosmotic agents
 - Muro 128 ung & gtts
- Bandage contact lens
 - Non-ionic vs. silicone hydrogel

Courtesy of Paul Karpecki, OD, FFAO

102

Treatment

- Daytime meds?
- What about hyperosmotic drops?
- Hyperosmotic gtts up to QID

Courtesy of Paul Karpecki, OD, FFAO

103


Treatment

- What medications should be avoided?
- Bland Artificial Tear Ointments

Eke T et al. Recurrent symptoms following traumatic corneal abrasion. Eye 1995 June

Courtesy of Paul Karpecki, OD, FFAO

104




Effective Treatments


- Steroids such as loteprednol
 - Q.I.D. x 2 wks then BID x 6 wks
- P.O. Tetracycline
 - Doxycycline 50 or 20 mg bid x 2 months

Dursun D. et al. Treatment of recalcitrant recurrent corneal erosions with inhibitors of matrix metalloproteinase-9, doxycycline and corticosteroids. *Optom* 2002; 73(9)

Courtesy of Paul Karpecki, OD, FAAO




105




Cause of Sliding Epithelium?

- Metalloproteinases which cleave Bowman's layer below the anchoring system (Hemidesmosomes)
- Develop through the production of Leukotrienes

Courtesy of Paul Karpecki, OD, FAAO



106




For how long should RCE therapy be maintained to obtain a clinical cure?


A. 1-2 weeks B. 6 weeks minimum

C. 1 month D. Until the first sign of resolution of symptoms

Courtesy of Paul Karpecki, OD, FAAO




107




New Treatment for Recalcitrant RCE

- Hyperosmotic ung x 2 mo
- Hyperosmotic drops tid x 2 mo
- Loteprednol qid x 2 weeks then bid x 6 weeks
- Doxy 20 mg PO BID x 2 mo

Courtesy of Paul Karpecki, OD, FAAO



108




Long Term or other options?


- Cyclosporine ophthalmic emulsion, 0.05%
- Lifitegrast ophthalmic solution, 5%
- Cyclosporine ophthalmic solution, 0.09%
- Nutritional Supplements
 - EPA/DHA + GLA
- Azithromycin

**All shown to inhibit MMP-9*

Courtesy of Paul Karpecki, OD, FAAO




109




Other Options for Recalcitrant Cases:

- Bandage Contact Lens
- Stromal Puncture
- Phototherapeutic Keratectomy (PTK)
- Autologous serum
- Amniotic membrane (cryopreserved)

Courtesy of Paul Karpecki, OD, FAAO




110



Conclusions

- The DDx for recurrent corneal erosion goes well beyond trauma
- 46% of cases are EBMD
- The location of epithelial breakdown helps in the DDx
- New therapies for recalcitrant cases

Courtesy of Paul Karpecki, OD, FAAO



111