Hallway controversies in ocular surface disease

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Disclosures

Last 12 months:
Allergan
AMO
Bausch/VM
Alcon
Cooper
Shire
Is the slit lamp obsolete?

Technology-driven Dx&Tx

Keratograph 5M
LipiFlow
MiBoFlo
InflammaDry
Sjo
TearLab Tear Osmolarity

Should I get a keratograph?
Keratograph 5M

Corneal Topography
Real Keratometry
Meibography
Tear Film Assessment (NIKIBUT)
Tear Meniscus Height
Bulbar redness

Non-invasive break up time (NIKIBUT)

Tear Meniscus Height measurement
Hom MM. Nguyen AL. Bilery L. Tear meniscus height by optical coherence tomography (OCT) and ocular itch. Academy of Asthma Allergy and Immunology. 2013 Poster #410 Session #:3210

“lower meniscus may serve as overflow, rather than an indication of total volume...upper meniscus height...may be a better marker of dry eye than lower meniscus height alone.”
Harrison W. et. al. The role of the upper meniscus in tear film formation and dry eye. American Academy of Optometry 2005 #053572
I am very concerned about this type of procedure for a few reasons.

1. You are now including another person in the procedure to place the device back where it should be on the tracks and this takes a lot of time to set up.
2. If the device is not aligned on the tracks the images either left or right may not be in focus.
3. The K5M could be damaged if it falls over as it is unstable resulting in huge shipping costs to go back to Germany to be fixed and down time is 4 to 6 weeks.
4. This would void any warranty claims if it did get damaged.
5. Patient chair time is now going to be longer waiting for this type of setup.

This type of procedure is not recommended by OCULUS.
Meibography

Pros
- Unlimited uses
- Run by technician
- Non-invasive

Cons
- No established norms & unclear grading systems
- Time consuming
- Cost about $15k
- Not covered by insurance

Is MiBoFlo a poor man’s Lipiflow?
Inflatable bladder pulses outer eyelids
Disposable under the eyelid
Heat and pressure upper and lower lids

TearScience LipiView
White light interferometry
Specular reflection
Interferogram
Captures 32 fps
LipiView about $60k
LipiFlow about $40k
$1500 to $2000 bilateral treatment
Disposables $350 per eye

Pros Cons
79% effective Not a cure, repeat treatments needed
Don Korb Expensive initial and disposables cost
Corneal distortion with lid therapy Not covered by insurance
Moderately invasive Other treatments

MiBoFlo
ThermoFlo Meibomian Duct Therapy

http://painpointmedical.com/miboflo.html
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
Cost about $24k
Typical charge $450/3 treatments

MiBoFlo

Tom Kislan, OD
n=51 1 month post tx 2m 4m

<table>
<thead>
<tr>
<th></th>
<th>1 month post tx</th>
<th>2m</th>
<th>4m</th>
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<tbody>
<tr>
<td>OSDI change</td>
<td>3 pts</td>
<td>12 pts</td>
<td>15 pts</td>
</tr>
<tr>
<td>SPEED change</td>
<td>4 pts</td>
<td>9 pts</td>
<td>12 pts</td>
</tr>
<tr>
<td>TBUT change</td>
<td>3.6 sec</td>
<td>5.8 sec</td>
<td>9.2 sec</td>
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<tr>
<td>Schirmer change</td>
<td>0mm</td>
<td>1mm</td>
<td>4.2mm</td>
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Pros Cons

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
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</thead>
<tbody>
<tr>
<td>Lower cost than LipiFlow</td>
<td>No published data</td>
</tr>
<tr>
<td>Corneal distortion with lid therapy</td>
<td>Not covered by insurance</td>
</tr>
<tr>
<td>Moderately invasive</td>
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</table>
InflammaDry-does it work?

- MMP-9 is a more sensitive diagnostic marker for dry eye than clinical signs alone.¹
- Inflammation is present before the clinical signs of dry eye.²
- Increased MMP-9 activity in dry eyes may contribute to deranged corneal epithelial barrier function, increased corneal desquamation, and corneal surface irregularity.³

InflammaDry

Punctal plugs

Meibomian glands
<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covered by insurance</td>
<td>Low profit margin</td>
</tr>
<tr>
<td>Run by technician</td>
<td>One time use</td>
</tr>
<tr>
<td>Minimally invasive</td>
<td>Difficult to read (presbyopic doctors)</td>
</tr>
</tbody>
</table>

Is Sjogren’s Syndrome the new dry eye?

https://www.youtube.com/watch?v=KWF_LCwH2M


Henrik Sjögren
1899-1986
Described in 1933 thesis
Harsh critique
Left academia

Table 5.1: Copenhagen criteria, Japanese criteria, Greek criteria, San Diego criteria, and San Francisco criteria correlations and dissimilarities

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Subjective dry eye</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subjective dry mouth</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Exclusivity objective</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>abnormalities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>History of gland swelling</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ocular tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Schirmer’s test</td>
<td>=c (10mm/5min)</td>
<td>&lt;c (10mm/5min)</td>
<td>=c (10mm/5min)</td>
<td>&lt;c (10mm/5min)</td>
<td>=c (10mm/5min)</td>
</tr>
</tbody>
</table>


MGD

27 SS, 29 ATD dry eye controls
MGD expression
Meibography

Fluorescein and rose bengal staining significantly higher
57.9% gland dropout

1. My mouth feels dry when eating a meal
2. I do not have enough saliva
3. I have difficulty in eating dry foods
4. I have difficulties swallowing certain foods
5. My lips feel dry
6. I sip liquids to aid in swallowing food

Ask: How often does your mouth feel dry?
Never  Occasionally  Frequently  Always

eyemage@mminternet.com
Case

33 year old Male
Discomfort with CL
Dry mouth: Frequently
Dry eyes: Frequently
Case

OSDI: 25.0 Moderate dry eye
Schirmer I: RE 9 LE 22 normal
Dx: Sjögren’s syndrome

Diagnosis

Sjö
Pros | Cons
---|---
Covered by insurance | No profit margin
Run by technician | Costly
Effective | Time consuming
Invasive

Treatments

Sjögren’s Syndrome

Rituxan
B-cell targeted
Orencia (abatacept)
T-cell targeted
Enbrel (etanercept)
Arthritis medication

Ambrus J. Emerging therapies for Sjögren's syndrome make way for collaboration. PCON, 2013
"Sjögren’s seems to fade when we prescribe etanercept (Enbrel, Amgen)"

“When patients are diagnosed earlier…therapy…may turn out to be successful”

“the glands are…fixed as opposed to when they are already dead and scarred.”


Early intervention

“the [tear] glands are…fixed as opposed to when they are already dead and scarred.”


TearLab

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covered by insurance</td>
<td>Reliability of results</td>
</tr>
<tr>
<td>Run by technician</td>
<td>Disposables required-one time use</td>
</tr>
<tr>
<td>Minimally invasive</td>
<td>Low profit margin</td>
</tr>
<tr>
<td>Lots of supporting data</td>
<td></td>
</tr>
</tbody>
</table>

Pros Cons
Is diabetes important to dry eye?

Diabetes

"Diabetes cases are rising rapidly in the US."

AOA First Look October 29, 2009

"Diabetes is now quickly emerging as one of the biggest health catastrophes the world has ever witnessed."

"The future of diabetes in America looks bleak…cases projected to double, even triple, by 2050.

Diabetes cases projected to double or even triple by 2050, report says. AOA First look. October 22, 2010

"lowering fat and calories...and increasing regular exercise to 150 min/week cut the rate...by 34 percent in overweight...people."

AOA First Look October 29, 2009

"the number with full-on diabetes grew from 23.6 million to 26 million"

AOA First Look, March 21, 2011
"nearly a third of the people in the diabetes belt were considered to be obese"

AOA First Look March 8, 2011

"without [lifestyle] changes, most people with prediabetes will develop type 2 diabetes within 10 years"

AOA First Look, March 21, 2011

“Unless Americans drastically change...diabetes may play a major role in nearly 90 percent of all patients seen by U.S. physicians in...five to 10 years.”

Bar RS. Guest column: Lifestyle changes could stop tsunami of diabetes cases. Des Moines Register May 23, 2011
“But the alternative is a U.S. medical profession that is overwhelmed by type 2 diabetes in 5 to 10 years.”

Bar RS. Guest column: Lifestyle changes could stop tsunami of diabetes cases. Des Moines Register May 23, 2011

http://www.desmoinesregister.com/article/20110524/OPINION01/105240364/-1/permgall/?odyssey=nav%7Chead

Theory:

Autonomic neuropathy decreases corneal sensitivity

Affects lacrimal gland secretion

Increased amounts of glucose in tears


Hyperglycemia

Impairs inflammatory cell function

Allows bacterial invasion

Diabetes = endophthalmitis risk factor

Case

52-year-old female
Dry eye symptoms: OSDI 25.0
moderate
Tear osmolarity: 293 normal
HA1c: 11.0%


Corneal disease
“Significantly higher rate of [endothelial] cell loss in type I diabetes”

“Significant decrease in cell density in the fourth and fifth decades.”

SCHULTZ, KAREN J. "CORNEAL ENDOTHELIAL CHANGES IN TYPE I AND TYPE II DIABETES MELLITUS RICHARD 0. SCHULTZ, MD, MAMORU MATSUDA, MD, RICHARD W. YEE, MD, HENRY F. EDELHAUSER, PH. D." American journal of ophthalmology 98.4 (1984).

“These results clearly indicate that the diabetic endothelium is morphologically abnormal.”

SCHULTZ, KAREN J. "CORNEAL ENDOTHELIAL CHANGES IN TYPE I AND TYPE II DIABETES MELLITUS RICHARD 0. SCHULTZ, MD, MAMORU MATSUDA, MD, RICHARD W. YEE, MD, HENRY F. EDELHAUSER, PH. D." American journal of ophthalmology 98.4 (1984).

“significant neurotrophic corneal disease can occur in diabetic patients.”

Diabetes → peripheral neuropathy → fewer nerves → lower corneal sensitivity → lower stimuli → thin epithelium → abrasions

“Confocal microscopy…[showed] decreases in nerve fiber bundle counts…impairment of corneal sensitivity.”

“Reduction in neurotrophic stimuli…may induce a thin epithelium that may lead to recurrent erosions.”
“Patients with diabetes are more prone to having corneal abrasions...I’m finding myself turning to daily disposables more and more because you’re not touching the eye as much.”

Paul Chous

“With my own eyes, after 45 years of type 1 diabetes, I can get a corneal erosion at the drop of a hat, and it’s not always in the same spot.”

“glucose fixes to the hemidesmosomes cells on the basal epithelium, making it very fragile.”

Paul Chous

“I definitely wouldn’t fit somebody with a 10, either. I like their A1c to be at least in the 7 to 8 range, or certainly lower. But anything higher, I would look at really closely.”

Brittany Mitchell
“I think it’s important to keep handling of the contact lens to a minimum”
Paul Chous

“Steroid diabetes”
Steroids stimulates glucose
Especially in the liver
Unable to produce enough extra insulin to compensate
Develops steroid diabetes

250 cataract surgery patients
Topical dexamethasone vs. diclofenac
Capillary blood sample
170 mg/dl
229 mg/dl 1month later
p=0.038

“topical corticosteroid eye drops may induce a significant increase in serum glucose concentration in diabetic patients...may interfere with their glycemic control”


“Begin with antibiotic treatment alone for 24 to 48 hours, then judiciously add a topical steroid thereafter”

Handbook of Ocular Disease Management
http://www.revoptom.com/handbook/sect3d.htm

Artificial tear review
### Artificial tears

<table>
<thead>
<tr>
<th>Product</th>
<th>Mechanism of action</th>
<th>Ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systane Ultra/Classic</td>
<td>pH activated, adds viscosity</td>
<td>HP Guar</td>
</tr>
<tr>
<td>Optive</td>
<td>compatible solutes, L-carnitine,</td>
<td>erythritol/CMC</td>
</tr>
<tr>
<td>Refresh</td>
<td>muco-adhesive</td>
<td>CMC</td>
</tr>
<tr>
<td>Blink tears</td>
<td>high shear thinning, sodium</td>
<td>hyaluronate</td>
</tr>
<tr>
<td>Soothe XP</td>
<td>emulsion</td>
<td>Mineral oil</td>
</tr>
<tr>
<td>Systane Balance</td>
<td>emulsion</td>
<td>Castor oil</td>
</tr>
<tr>
<td>Refresh Optive Advanced</td>
<td>oncotic &quot;water-logged&quot; lipid</td>
<td>Amisol</td>
</tr>
<tr>
<td>FreshKote</td>
<td>Hypotonic hypo-osmo</td>
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</tr>
</tbody>
</table>

### Systane

- Systane Ultra
  - Systane Classic
  - HP guar
Blink tears

Sodium hyaluronate
0.15% HA

Systane Balance

Balance
Emulsion tear

Refresh Optive Advanced

ROA
Emulsion tear
Most dry eye is evaporative (MGD)
Stage 2 - artificial tears (MGD workshop)
Stage 1-1st line treatment: emulsion tears


Soothe XP

Bausch and Lomb

Steroids- good or bad?
Loteprednol

Site specific steroids
Pregnancy Category C
0.2% loteprednol (Alrex)
0.5% loteprednol (Lotemax)
Systemic steroids appear in milk

Loteprednol

102 dry eye patients
Lotemax gel (0.5%)
BID
At 12 weeks IOP safe as Restasis


Thank you!

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