“My Eyes Burn… My Eyes Water”
The Technician’s Role in Tear Film Disorders

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Objectives
1) Who suffers from dry eye syndrome?
2) What symptoms might indicate dry eyes?
3) What questions should you ask during case history to detect a potential dry eye patient?
4) What signs does the doctor look for and what are the diagnostic tests for dry eyes?
5) What are the different types or stages of dry eyes?
6) What are the available treatment options?

Dry Eye Syndrome
• A disease of the ocular surface due to an abnormality of the tear film
• “Tear Film Insufficiency”
• “Dysfunctional Tear Syndrome”
• “Keratoconjunctivitis Sicca”

A common condition...
• Prevalence of 1 out of every 5 patients!!
• ~ 59 million Americans suffer from dry eyes
• Symptoms related to dry eyes are among leading causes of patient visits to eye doctors
• Even more patients suffer but many don’t bring up their symptoms with their doctors

Increased prevalence in...
• WOMEN!!
  – At least TWICE as common in women as men
• Older age
  – Affects 75% of patients who over the age of 65
• Contact Lens Wearers
  – 40 to 60% of soft contact lens wearers experience dry eye symptoms

Symptoms
• Irritation
• Burning
• Stinging
• Grittiness
• Itching
• Discomfort / pain
• Dryness
• Foreign body sensation
• Redness
• Mucus discharge
• Tearing
• Photophobia
• Intermittently blurred vision
• Increased frequency of having to blink
• Tired-feeling eyes
• Contact lens intolerance
**Symptoms**

- May occur Intermittently
  - Exposure to dry, dirty, or windy environment
  - Only while at work on computer
  - Only while contacts are in
  - Only in the winter
  - Only while ceiling fan is on

- May be Chronic
  - Environmental
  - Side Effect of Medications
  - Systemic diseases
  - Eyelid disease

**3 Layers to a Healthy Tear Film**

1) **Lipid Layer “OIL”**
   - Outermost layer
   - Prevents evaporation
   - Secreted by meibomian glands along eyelid margin

2) **Aqueous Layer “WATER”**
   - Middle layer
   - Complex mixture of proteins, electrolytes, antibacterial agents
   - Secreted by main lacrimal gland and by accessory lacrimal glands located in eyelids

3) **Mucin Layer “MUCUS”**
   - Innermost layer – actually attaches to epithelial surface
   - Provides tear viscosity and stability during blinking
   - Secreted by goblet cells in the conjunctiva

**Functions of a Healthy Tear Film**

- **Lubrication**
  - Increased comfort
  - Decreased friction between eyelid and eyeball surface

- **Optical Clarity**
  - Creates smooth refractive surface on front of eye

- **Protection from environmental and infectious insults**
  - Rinse out dirt and debris
  - Contains natural anti-bacterial agents/antibodies

- **Maintain pH and necessary electrolytes**
  - Oxygen, Vitamins, Nutrients

- **Contain proteins necessary for growth and wound healing**

**Etiology**

- **Decreased tear production**
  - “aqueous deficiency” = just not making enough tears

- **Excessive tear evaporation**
  - “lipid deficiency” = making tears but evaporating too quickly

- **Abnormal tear composition**
  - incorrect mix of oil, water and mucus to successfully lubricate the eye

- **Inflammation**

**Inflammation**

- In normal state, immune system kept under control by regulatory pathway
- In disease state, regulatory pathway does not function and excess inflammation results

- **↑ Inflammation = decrease function of lacrimal gland = ↑ dryness = ↑ inflammation = ↑ dryness = vicious cycle**
Factors associated with Dry Eyes that can be discovered from Patient History

- Older age
- Female Gender
  - Peri-Menopausal or Post-Menopausal
  - Hx of total hysterectomy

Environmental / Lifestyle

- Smoker?
- Air Travel?
- Ventilation systems at work?
- Ceiling fan on at home or while sleeping?
- Prolonged exposure to wind?
- Work outside?
- Work under fluorescent lights?
- Computer use?
- Video game use?
- Eye makeup? How old is it?
- Contact lens wear?

Refractive Surgery

- LASIK/PRK
  - Disrupt the sensory nerves of the cornea
  - Reduced corneal sensitivity
  - Decreased tear production
  - Decreased tear stability
  - Decreased blink rate
  - Recovery in approximately 6 months after surgery, but sometimes longer

Associated Systemic Diseases

- Autoimmune or Inflammatory Diseases
  - Rheumatoid Arthritis
  - Sjogren’s syndrome
  - Fibromyalgia
  - Lupus
  - Scleroderma
  - Inflammatory Bowel Syndrome

- Diabetes
- Thyroid Disease – not enough tears and increased ocular surface exposure
- Cancer – chemotherapy dries out lacrimal glands and kills off goblet cells
- Rosacea – causes lid disease / inflammation
- Allergic Diseases (eczema, asthma, atopic dermatitis)
- Bell’s (Facial Nerve) Palsy – leads to exposure
- Parkinson’s Disease – meds plus exposure
- Previous Stroke – reduced blink, increased exposure
- Menopause

Systemic Medications

- Antihistamines and Decongestants
- Diuretics (“water pill” - Lasix, furosemide, spironolactone)
- Birth Control Pills
- Acne Medications (Accutane)
- Beta-blockers (for blood pressure - atenolol)
- Hormone Replacement Therapy
- Pain medications (narcotics)
- Anti-depressants (Zoloft, Paxil, Prozac, Wellbutrin)
- Anti-psychotics
- Sleeping pills
- Incontinence medications
- Radiation/Chemotherapy
Topical Glaucoma Medications

- Dry eye may be present in up to 40% of glaucoma patients
- BAK (benzalkonium chloride)
  - Preservative in eye drops
  - Chronic exposure disrupts tear film function, increases inflammation, leads to damage of epithelial surface

Dry Eye Questionnaire

- Perhaps a tool the front desk could hand a patient to fill out before they are brought back into an exam room?

Signs & Tests

External Examination

- **Rosacea** on cheeks, nose
- **Inability to close eye completely**
  - Lagophthalmos
  - Facial Nerve Palsy (ie: Bell’s Palsy)
- **Blink Rate**
  - **Reduced rate leads to exposure**
    - Side effect of anti-psych, anti-seizure, anti-dementia, anti pain meds
    - Side effect of Stroke, Dementia, Reduced brain function
  - **Excessive blinking**
    - Sign that patient is bothered by ocular surface symptoms

Slit Lamp Examination

- **Lid Margins**
  - Apposition of lids to globe (*ectropion*)
  - Blepharitis:
    - Telangiectasia and Erythema
    - Meibomian gland blockages
    - Crusting or collarettes at bases of lashes
- **Tear Meniscus**
- **Tear Debris**

Conjunctival &/or Corneal Staining

- **Sodium Fluorescein**
  - Orange dye that fluoresces under blue light
    - Stains damaged epithelial cells
    - “Punctate staining”
- **Rose Bengal & Lissamine Green**
  - Stains devitalized conjunctival and cornea cells
  - Highlights areas of discontinuous tear film
  - RB stings, LG does not
  - May show damage earlier than Fluorescein
Corneal stains

Tear Break Up Time (TBUT)

TBUT

Slit Lamp Exam

- Conjunctival Injection (dilated vessels, redness)
- Conjunctival Staining
- Corneal Staining
- Corneal Compromise
  - Erosions
  - Filaments (mucus strands adhered to cornea)

Corneal Staining with Fluorescein

Corneal Staining with Fluorescein
Clinical Appearance of a Dry Eye

Schirmer’s Testing
- Small strips of paper applied at outer corners of eyes to act like wicks to draw out wetness
- Measures tear production over 5 minutes
- Schirmer’s II **
  - Use anesthetic so goal is to measure basal secretion
  - Patient look up to avoid paper hitting cornea
  - Less than 15 mm = aqueous deficiency

4 Classifications of DTS (Dysfunctional Tear Syndrome)
- **Severity Level 1**
  - Mild symptoms, + conj signs, - corneal signs
- **Severity Level 2**
  - Moderate symptoms, + conj signs, + corneal signs, visual disruption
- **Severity Level 3**
  - Severe symptoms, significant conj and corneal staining, filaments on cornea
- **Severity Level 4**
  - Severe symptoms, severe staining, corneal erosions, conjunctival and corneal scarring

Goals of therapy
1) Reduce or alleviate symptoms
2) Maintain stable vision
3) Reduce/prevent surface damage
4) Prevent progression
5) Informed/Educated patients
  - More likely to comply with recommended therapy
  - If understand process, feel more in control of it

Treatment Options
- Environmental Adjustments
- Over-the-counter Lubricants
- Prescriptions Drops
- Surgical options

Environmental Adjustments
- Avoid smoke
- Remove fans/forced air
- Use humidifier in home or office
- Hypoallergenic make-up
- Hydrate better
  - Drink more water, avoid caffeine/diuretics
- Get more sleep
- Limit time on computer or in front of a monitor
- Lower computer screen below eye level
- Contact lenses (change more often, better suited material, keep clean, wear less)
**Eyelid Scrubs**
- Warm wet washcloth
- Diluted baby shampoo
- Prepared Scrubs

**Artificial Tears**
- Mainstay of therapy
- Don’t address underlying cause, just provide relief of symptoms
- Preserved vs Non-preserved
  - If ≥ 4x/day, then do PF
- Avoid “Red-Eye Relievers”
- Varying viscosities
  - Runny, Oillier, LiquiGel, Gel, Ointment

**Daytime “Runnier” Tears**

**Thicker “Gel-like” Drops**
**Great for Nighttime**

**Lubricant Gels/Ungs**
- Gels are water based – not as greasy
- Ointments are oil based – very greasy

**Drops Designed to Replace the Oil (Lipid) Layer**
- Ideal for patients with meibomian gland dysfunction
- Maybe a better choice for your “my eyes always water” patients since its not a “quantity” but a “quality” problem
Omega-3 Fatty Acids

- FA are nutrients needed from diet, your body cannot make them
  - Omega-6’s rich in meats, dairy, fried foods
  - Omega-3’s rich in certain fish and nuts
    - Fish Oil and Flaxseed Oil
- Omega-3’s work by:
  1) Decreasing inflammation (omega-6’s increase it)
  2) Increase lipid component of tear film
  3) Indirectly stimulate tear secretion from lacrimal gland

Omega-3 Supplements

- TheraTears Nutrition®
- Systane Vitamin®
- Many other brands
  - Omega-3’s also being studied and found beneficial in heart disease, cholesterol, and at preserving mental status

Prescription Medicines

- Topical Corticosteroids
  - Alrex, Lotemax, fluorometholone (FML), prednisolone acetate 1%
  - Immediately decrease surface inflammation
  - Use initially and for flare-ups, short term
  - ? Safety long-term use (IOP increase, cataract formation, risk of infection)
  - Not safe for CL wearers

Topical Corticosteroids

- Restasis®
  - Cyclosporine emulsion in Preservative Free vials
  - Vehicle of medicine is Refresh Endura
  - Reduces Inflammation
    - Very effective for Auto-immune and post-menopausal women
  - Can take up to 3-6 months to notice benefits
  - Safe for long term use
  - 1 gtt BID OU
  - Safe to use with CL
    - Put in 10 minutes before CL and then after CL out
  - Side Effects = burning, redness
    - Recommend artificial tear first to coat nerve endings

Restasis®

- 60 vials = 1 month supply
- 180 vials = 3 month supply
- If use same vial morning and night, will cut price in ½
Oral Antibiotics

- Treat meibomian glands
  - Doxycycline, Minocycline
  - Not just antibiotic properties
  - Have enzymes that decrease inflammation and improve meibomian gland function
  - Small daily dose for 1 to 3 months, or longer
  - Good for patients with concurrent lid disease (blepharitis, rosacea)

- Side effects
  - Allergy to medication
  - Stomach upset (take with food)
  - Sun intolerance (more likely to sunburn)
  - Reduced efficiency of BCP
  - Yeast infection

**CANNOT GIVE TO KIDS OR IF PREGNANT**

AzaSite ®

- Topical medication to treat lid disease
- Thick drop that penetrates into meibomian glands through eyelids
- Reduces inflammation of eyelids
- 1 gtt QHS x 1 month (then stop, take a break for a month, then may repeat if necessary)
- Tell patients to keep bottle store upside down
- $$$ - may be hard to find in stock right now

Prescriptions for Severe Cases

- Autologous serum drops
  - Draw blood, centrifuge and dilute with saline
  - Drops of the serum contain growth factors that stimulate epithelial healing and cell division

- Oral pilocarpine
  - For patients with Sjogren’s Syndrome
  - Stimulates increased gland secretions

- Oral Immunosuppressants (steroids, methotrexate, etc)
  - Those with bad disease
  - Most likely associated with underlying auto-immune disorder

Surgical Options

- Punctal Plugs
  - Place inferior only or inferior and superior
  - Can try collagen dissolvable plugs 1st
  - Prefer mushroom cap style – removable

- Punctal Cautery
  - Permanently seals shut punctum

- Tarsorrhaphy
  - Suture together outer 1/3 or so of upper and lower lids temporarily to reduce exposure

Punctal Plugs
Art, not just science

- Not everyone responds to same therapy, have to tailor to each patient

- **Patient education is crucial**
  - Underlying causes
  - Environmental adjustments
  - How to use recommended medicines
  - Letting them know to inform us if current therapy not effective enough

Role of Technician

- **Taking Good History**
  - Elicit Symptoms (how bothersome, how often)
  - Associated factors (medicines, environment, underlying diseases)
  - Previous therapies pt has tried

- Understand dry eye so can act as a sympathetic advocate and can spend time educating/rediscussing management with patient after Dr. leaves

Questions?

Thank You!