School of Optometry: Dellen-pinguecula

Exposure Keratitis

Chronic Allergy

- Dry eye reported by 36% of allergy suffers
- Destabilizes the tear film
- GPC, vernal KC,

Ocular Surface Toxicity

- Toxic effects of topical agents: preservatives & or the active medication itself: ie. Topical glaucoma meds. can cause conjunctival metaplasia, loss of goblet cells & inflammation

Environmental Influences

- Pollution keratoconjunctivitis, office dry eye, sick building syndrome due to poor indoor air-quality in temperature controlled office environments
Diagnosing the Dry Eye

- History/Symptoms (variable) – “OSDI” questionnaire (refer to hand out)
- Gross evaluation of eyelids structure, apposition, blink rate, redness, facial features, hands
- Biomicroscopy— tear meniscus, tear debris and viscosity, blepharitis, MGD
- Tests of the tear film-TBUT, noninvasive —(tearscope by Keeler Inst.)
- Dye testing-FL, RB, LG
- Schirmer’s testing & phenol-cotton thread test
- Tear hyperosmolarity

Medical History

- Identify medications
- Identify related systemic diseases

Ocular Symptoms

- Patient’s complaints traditionally have been considered an unreliable indicator
  - Foreign body sensation
  - Burning
  - Redness
  - Excess secretion
  - Burning
  - Redness

PATIENT SYMPTOMS CLINICAL SIGNS

- Dryness
- Itchiness or scratchiness
- Photophobia
- Contact lens intolerance
- Burning or stinging
- Foreign body sensation
- Grittiness
- Fluctuating visual acuity
- Tired eyes
- General discomfort
- Hyperemia
- Low tear meniscus
- Tear debris
- Abnormal tear osmolarity
- Fast tear break up time
- Conjunctival staining
- Blepharitis
- Increased cytokines
- Corneal surface damage
- Dryness
- Itchiness or scratchiness
- Photophobia
- Contact lens intolerance
- Burning or stinging
- Foreign body sensation
- Grittiness
- Fluctuating visual acuity
- Tired eyes
- General discomfort

Ocular Surface Disease Index (OSDI)

[OSDI questionnaire image]
**Diagnostic tests**

- Schirmer’s tear test 1 shows decreased reflex tearing in lacrimal gland disease <6mm
- Fluorescein tear break up time (FBUT) measures tear film stability < 10 seconds: “The Dry Eye Test”
- Fluorescein staining indicates corneal epithelial integrity
- Rose bengal and lissamine green staining indicates the integrity of conj. surface- grading scale
- Tear film osmolarity is increased in dry eye
- Impression cytology shows squamous metaplasia
- Tear lactoferrin is decreased in aqueous tear def.
- Tear turnover rate is 40% lower in dry subjects

**External & Slit Lamp Examination**

- External eye and the adenexa
- Blepharitis signs & lid anomalies
- Observe the the blink rate, visous precorneal tear film, tear debris, tear meniscus, faster of conj., and conj injection
- Apply fluorescein dye- height of tear meniscus, corneal staining, TBUT
- Rose bengal or Lissamine green staining
- Location of staining can be significant indicator of cause of dry eye
- Mucous plaques, filaments, secondary infections, scarring, neovascularization, thinning, perforation

**Ocular Signs**

**Lids**

- Positioning
- Blinking pattern
- Punctal positioning
- Patency of puncta

**Tear Film Stability**

- Result of either tear deficiency or evaporative DES
- TBUT < 10 secs symptomatic
- The Dry Eye Test (DET)
- Xeroscope- projects a lighted grid pattern onto the tear surface 40secs normals & 12 secs abnormal
- New Method for Evaluating TBUT- Hartmann-Shack wave front sensor
- Subjective testing

**Non-invasive tear film breakup time**

- Use second hand of a watch
- Blink 2 to 3 times and then stare straight ahead at a fixed point
- Note the time from the last blink to first sensation of ocular awareness.
Staining

• Fluorescein dye staining indicates where the tight junctions of epithelial cells are disrupted and produce characteristic inferior 1/3 staining of the cornea

Rose Bengal or LG Staining Scores

• Dyes stain dead & devitalized cells, mucous and areas where the mucous layer is missing over cells
• Based on grades 0-3 in each of three areas- nasal exposed bulbar conj., temporal bulbar exposed conj. and cornea for a total score of 9
  – If 3 or greater then a positive test
  – Typically conjunctiva stains more than cornea, nasal greater
• Lissamine green has at least 3 advantages over RB
  – Less toxic to the cells
  – Doesn’t last as long
  – Doesn’t sting as much
  – Note: slit lamp exam ASAP- a significant dilutional effect

Tear Production/Schirmer Testing

• Schirmer I test – performed without anesthetic is felt to be better test to determine how many tears the eye can produce without stimulation: < 5 secs confirms a diagnosis of DES, 6-10 secs. suspicious
• Schirmer with anesthetic– Basic secretion test – gives less info.
• Schirmer II test– stimulating the nasal mucosa with a cotton tip application is rarely indicated
• Phenol red tear test (PRT): normal-24mm in 15 secs, abnormal-11mm in 15 secs

Schirmer Tear Tests

• Severe: 5mm or less
• Moderate: 5-10 mm
• Mild: 10-15 mm

New Diagnostic Clinical Tests

• DET fluorescein strips from Akom
  – Small thin strip
  – Much less fluorescein instilled
  – Several studies report this makes TBUT testing more repeatable

Other Tests

• Abnormal tear lysozymes- tear lactoferrin- The Touch Tear Lactoferrin Micro assay by Touch Scientific
• Conjunctival scrapings—numerous goblet cells, devitalized and keratinized cells are seen
• Osmometers to measure tear film osmolarity
• Fluorescein clearance test
• Corneal sensation- cotton wisp
Oral Symptoms

- Saliva production— Key question to ask is “Can you eat a biscuit or a cracker without drinking water and do you sleep with a glass of water by your bed at night”
- Poor oral hygiene and frequent dental caries
- Decreased parotid flow
- Labial salivary gland biopsy

Systemic Evaluation

- Serological tests— LE, ANA, CBC, ESR, Anti DNA antibody levels, RH factor, Autoantibodies (Ro/SS-A and SS-B)
- Presence of antinuclear antibody>1:160, rheumatoid factor1:160, & positive SS-A (Ro), and /or SS-B (La)

How Tear Film Instability Occurs

Normal Tear Prism

Tear prism- Dry eye

Tear film break up is indicated by the dark areas that appear on the cornea.
Complications

- Filaments
- Persistent epithelial defects
- Secondary infections
- Scarring
**Lid Wiper Epitheliopathy**

- Characterized by presence of damaged epithelial cells on lid wiper portion of marginal conjunctiva
- Fluorescein or rose bengal can be used to dye the lid wiper
- Staining graded on scale of 0 to 3, where 0 = no staining, 3 = heavy staining

**Dry Eye Symptoms and Lid Wiper Epitheliopathy**

- Presence of lid wiper staining accompanies dry eye symptoms (DES) even in patients who do not merit a DES diagnosis based on other clinical signs
- Lid-wiper staining may be a more accurate measure of DES than current clinical tests
- An artificial tear capable of reducing lid wiper staining could alleviate dry eye symptoms

**Prevalence of Lid-Wiper Staining (by Grade and Total) in Symptomatic and Asymptomatic Subjects**

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