Ocular Surface Disease Innovations in Clinical Care

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Description: Ocular Surface Disease presents a complex diagnostic challenge for even seasoned clinicians. A comprehensive assessment is critical in differentiating the diagnosis and treatment strategies. This course provides a step by step review of current and emerging technologies available and recommendations on how these can be incorporated into practice to improve patient care.

Course Learning Objectives

- To review dry eye disease presentation
- To understand emerging technology and how it may be integrated into practice
- To determine patient selection for testing and proper interpretation
- To review several cases of ocular surface disease

Outline

I. Why feature Dry Eye Disease (DED) treatment in your practice?
   a. Number of patients (population) effected
   b. Patients seeking individualized care
   c. Revenue to be generated

II. Research in DED
   a. Women's health study
   b. Beaver dam eye
   c. The Salisbury eye evaluation
   d. The Melbourne vip
   e. The Canadian experience

III. Tear composition

a. Tear layers
b. Tear function
c. Tear types
d. Tear composition

IV. Tears beyond physiology
a. Emotion
b. Art

V. The role of blinking in DED
a. Functions
b. Research

VI. Features of DED
a. History of DED
b. Types of DED
    i. Evaporative
    ii. Aqueous deficient
c. Causes of DED
    i. Environmental
        1. Heat
        2. Air
        3. Wind
        4. Office work
        5. Blink performance
            a. Involuntary
            b. Secondary to activity (reading, computer use)
    ii. Age
        1. Lid Laxity
        2. Lagophthalmous
            a. Age-related vs. surgically-induced
    iii. Gender

1. Hormone changes
    a. Menopause
    b. Oral contraception (see also medications)

iv. Medications
1. Oral
    a. Antihistamines
    b. Antidepressants
    c. Certain hypertensive medications
    d. Decongestants
    e. Isotretinoin-type drugs for acne
2. Ophthalmic
    a. Allergy medications
    b. Glaucoma medications
    c. BAK sensitivities

v. Nutritional deficiencies
1. Vitamin A
2. Omega 3's

vi. Surgeries/Medical treatments/Trauma
1. Refractive
    a. LASIK
2. Cataract
3. Radiation therapy near eyes
4. Lid surgeries
5. Burns

vii. Chronic illness
1. Diabetes
2. Thyroid disease
3. Autoimmune disease
    a. Rheumatoid arthritis

b. Sjogren's syndrome
c. Lupus

VII. Advanced diagnostic testing for DED

a. Tear osmolarity

i. Osmolarity vs Osmolality
ii. Freezing point depression osmometer
iii. Vapor pressure osmometer
iv. Electrical impedence osmometer (Tear Lab)

1. Cost of unit and disposable cards and potential reimbursement
2. single-use microchip embedded with gold electrodes
3. measures the electrical impedance of the tear fluid sample in a tiny channel in the chip
4. 50nL is collected
    a. "Smaller than the period at the end of this sentence," as the manufacturer describes it.
    b. Collection from the inferior lateral meniscus of the tear film by passive capillary action.
5. Pro's
    a. Easy to administer
    b. Quick results
    c. Reimbursable by Medicare
6. Con's
    a. Cost of unit
    b. Cost of disposables
    c. Variability of testing
7. Test results
    a. Each of the above methods provides a numeric osmolarity measurement. The higher the measurement, the "drier"

the eye. It's measured in milliosmoles per liter (mOsmol/L), such that a reading of:

   b. 316mOsmol/L and higher indicates dry eye (hyperosmolarity)
   c. 290mOsmol/L to 316mOsmol/L suggests borderline or intermittent dry eye.
   d. 290mOsmol/L and below is healthy and normal.
   e. Asymmetry between eyes may also be indicator of DED

b. RPS InflammaDry
   i. Detects elevated MMP-9 in tears
   ii. Cost per unit and potential reimbursement
   iii. Studies indicate MMP-9 as a useful biomarker for diagnosing, classifying and monitoring DED
   iv. MMP-9
   v. Use of system
      1. Small applicator briefly touches the conjunctiva
      2. Sample holder snaps into test cassette
      3. Test cassette tip is submerged in solution for 10-15 seconds
      4. Solution draws up through conduit picking up antibodies to MMP-9 labeled with nanoparticles of gold distributed through the filter paper
      5. If sufficient nanoparticles are localized, a red line results (positive test)
      6. Results in 10 minutes
      7. Indicates presence of MMP-9 and to a certain degree the amount of surface inflammation
   vi. Pro's and Con's
      1. Pro's: inexpensive, fast, identifies presence of inflammation
      2. Con's: Doesn't really identify how much inflammation or the cause

c. Oculus Keratograph
    i. Tear film analysis by non-invasive (non-contact) scanning software
    ii. Tests performed by keratograph
        1. NIKBUT – Non-invasive Keratography Tear Break Up time
            a. Uses placido disc ring-based corneal topography
            b. Uniquely objective
            c. No dye required
            d. Provides “Initial Break” and “Average Break”
        2. Non-contact Meibography/Meibo-scan
            a. Evaluation via infrared photography
            b. Greater room to maneuver by K4 standards
        3. Tear Meniscus height
            a. Helps determine tear film quality
            b. Amount of tears at lower tear meniscus
            c. White or infrared illumination
            d. High-resolution camera to record images
        4. Tear Dynamics
            a. Interference color pattern and structure evaluation
            b. Video can record up to 32 images per second
                i. Evaluating spread of particles in the tear film to determine viscosity
        5. Topography
            a. Guarantees perfect reproducibility
            b. Usefully in observation and management:
                i. Corneal disease (K. Sicca, keratoconus, etc)
                ii. Contact lens fitting
                iii. Pre- and post-surgical considerations
        6. Bulbar redness/R-Scan

a. First instrument to offer fully automatic determination of bulbar redness
b. Documents and classifies bulbar and limbal redness objectively
c. Detects conjunctival vessels and assesses degree of redness

d. Lipiview
    i. Diagnostic instrument to TearScience system for evaluation of meibomian gland dysfunction (MGD)
    ii. Uses interferometry to measure lipid layer thickness between blinks
        1. Quantitative assessment in interferometric color units (ICU)
            a. Similar to nanometers
            b. Pilot study: 137 consecutive patients completed SPEED test, then measured ICUs by Lipiview
                i. SPEED >10, 74% had LLT of 60nm or less
                ii. SPEED = 0, had LLT 75nm or greater
                iii. Linear regression analysis found statistical significance between LLT and symptom score
                iv. As LLT increased, symptom score decreased
    iii. Breakdown test results
        1. C factor
        2. ICUs
        3. Partial/complete blinks
        4. Video display

e. ZoneQuick
    i. Red cotton thread treated with phenolsulfonphthalein
        1. Yellow (acidic) = water absorption indicator
        2. Red (basic) = tear volume indicator
    ii. Testing conditions
        1. No anesthesia

2. 5 minutes after other drops instilled
3. May be used with contact lenses

iii. Test procedure

iv. Test interpretation

v. Cost

f. Microscopy for demodex evaluation

VIII. 4 DED Case reports

http://www.revophth.com/content/t/dry_eye/c/36946/

http://www.revophth.com/content/d/technology_update/c/29093/#sthash.d333cInO.dpuf

http://www.revophth.com/content/d/technology_update/c/29093/

http://www.revoptom.com/content/d/dry_eye_report/i/1378/c/26521/

http://www.optometricmanagement.com/articleviewer.aspx?articleID=107049

http://www.journalofoptometry.org/en/historical-overview-of-imaging-the/articulo/90184686/

http://www.jphmedical.com/PDFs/OCULUS%20Keratograph%205M%20The%20Revolution%20in%20Topography%20and%20Dry%20Eye%20Screening.pdf

http://www.revoptom.com/content/c/35148/dnnprintmode/true/?skinsrc=%5Bl%5Dskins/ro2009/pageprint&containersrc=%5Bl%5Dcontainers/ro2009/simple