Ocular Surface Disease Workshop

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Description

As our understanding of the ocular surface spectrum has evolved, so have the diagnostic and treatment tools used to identify and treat/manage these varying disease states. This workshop will present attendees with a hands-on opportunity alongside experienced doctors the various technologies. There will be a detailed and informative introduction where the different testing modalities will be explained and how to implement them into clinical practice.

Objectives

- Understand the importance of integrated eyecare and where OSD fits in
- Review the impact that ocular surface disease has on patient satisfaction and outcomes
- Increase clinicians understanding of the diagnosis of ocular surface disease and how to utilize technology
- Discuss available treatment options and management protocols
- Attendees will have the opportunity to use the various technologies and test in a hands-on workshop
- Attendees will review how to implement OSD management into daily practice

1. Introduction –
    a. What and why treating OSD is important?
        i. Address signs/symptoms
        ii. Provide relief to patients for which there are limited treatment options
        iii. Improve CL intolerance
        iv. Improve outcomes in surgical procedures
        v. To grow your practice
    b. Patients Win: Diagnostic Accuracy
        i. Improved sensitivity and specificity of differential diagnosis using point of care testing
    c. Insurers Win: Targeted Therapy
        i. Treatments are specific to the diagnosis versus empirical treatment
    d. Doctors Win: Practice Growth
        i. Increase patient satisfaction will increase word of mouth referrals for an under-recognized and under-treated condition
    e. Practices Win: Income Diversification

i. Mix of both insurance based and cash based services. With the decline in insurance reimbursement, cash based services increase revenue stream.

2. Dry eye market overview –
    a. Prevalence rates
        i. Dry eye disease – 5-50% in different areas of the world[1]
        ii. Lid disease[2]
            1. Posterior blepharitis 24 percent
            2. Anterior blepharitis 12 percent
        iii. Allergic eye disease – 25-59%[3]
    b. Economic impact of OSD
        i. The burden of DED for the US health care system is estimated to be almost $4 billion[4]
        ii. Lost productivity > $55 billion for overall US society
3. Diagnostic Testing – 10 min
    a. Impact of TFOS DEWS II on current practice
    b. Traditional testing
        i. Screening questionnaire – Which questionnaire is preferred?
            1. SPEED
            2. OSDI
            3. DEQ-5
        ii. Lid evaluation
            1. Manual Expression – diagnostic vs. therapeutic
            2. Vascularization
            3. Quality of Secretions
            4. Meibography
                a. Transillumination
                b. Dynamic Meibomian Imaging
            5. Partial blink rate
            6. Lipid interferometry
            7. Devices
                a. Lipiview II
                b. Oculus Keratograph 5M
        iii. Tear meniscus - normal average TMH is 0.20mm where any measurement lower would indicate a decreased tear volume
        iv. Tear film break up time – normal range > 10 seconds
        v. Ocular surface staining
            1. Nafl - Sodium fluorescein (NaFl) is the commonly used dye which highlights any break on the corneal epithelium caused by micro-abrasion or desiccation
            2. Lissamine green - to check for devitalized cells on the conjunctiva and early signs of dry eye disease
        vi. Schirmer / Red Thread Test - 5 minutes time with 15 mm or greater in tear secretion being considered normal

c. Point of Care Testing Available
    i. TearLab Osmolarity – measures homeostasis of the tears
        1. Readings above 308 mosm or an inter-eye difference of >8 mosm are indications of mild hyperosmolarity and loss of homeostasis
    ii. Quidel Inflammadry - MMP-9 - a nonspecific inflammatory marker that has consistently been shown to be elevated in the tears of patients with dry eyes
        1. MMP-9 levels greater than 40ng/ml can be detected indicative of a positive test
    iii. Tearscience Lipiscan – Meibomian gland imaging
        1. Dynamic illumination – surface lighting originates from multiple light sources to minimize reflection
        2. Adaptive transillumination – Changes to the light intensity across the surface of the illuminator compensate for the lid thickness variations between patients
    iv. Oculus Keratograph 5m – corneal topographer with dry eye testing capabilities
        1. Measures tear film height
        2. Ocular redness score
        3. Images Meibomian glands
        4. Noninvasive Keratograph Break up time
    v. Meibox Meibographer - the first HD slit lamp mounted meibographer that provides high resolution images of meibomian glands
    vi. HD Analyzer – measures tear film stability evaluating the tear film breakup time using point spread functions
    vii. Advanced Tear Diagnostics – measure both lactoferrin and IgE levels in the tear film

4. Hands-on Workshop –
    a. Rotating Stations
        i. Tear Osmolarity
        ii. Allergy testing
        iii. Punctal Plugs
        iv. Neurostimulation
        v. MGD Dx / Treatments
    b. TearLab –
        i. What is tear osmolarity? A measure of solid particles in a solution. In the case of the tear film, a measure of the salt concentration in the tearfilm.
        ii. What is tear hyperosmolarity? Increase in salt concentration of the tears leading to an imbalance.
            1. Is the central pathophysiologic mechanism for all forms of DED

2. Causes inflammation and apoptosis
3. Leads to a breakdown of homeostatic control causing tear film instability
4. Reduces the ability of mucins to lubricate

iii. Normal subjects exhibit low and stable osmolarity
1. Normal tear osmolarity = Equivalent to blood osmolarity = 280-295 mOsms/L
2. Indicative of the tears being held in proper homeostasis

iv. Dry Eye subjects exhibit elevated and unstable osmolarity
1. Osmolarity changes between eyes and over time
2. Inter-eye difference = hallmark of DED1 (> 8 mOsms/L between eyes)
3. 300-320 – Mild hyperosmolarity
4. 320-340 – Moderate hyperosmolarity
5. 340+ - Severe hyperosmolarity

v. Review of product usage and testing protocols

c. Allergy Testing –
i. Indicated for patients with ocular and systemic allergies
ii. Many symptoms of ocular allergy and dry eye overlap
iii. Increase sensitivity and specificity of disease to provide targeted therapy
iv. Many patients take systemic antihistamines but may not be beneficial and/or warranted
v. Tests are available from various companies
1. Regionalized, proprietary panels of ocular-specific allergen
2. Test is covered by major insurance plans
3. FDA Approved
4. No Needles
5. No Shots
6. Takes 3 minutes to perform with results in 10-15 minutes

vi. Integration with PCP/ENT/Allergists

d. Role of Punctal Occlusion – \
i. Occludes the tear duct which carries tears away from the ocular surface
ii. Commonly used for dry eye disease
iii. Other considerations
1. Herpes simplex/zoster keratitis
2. Glaucoma
3. Acute ocular infections
4. Other????

iv. Materials, Instruments, Supplies
1. Material - Collagen / silicone / acrylic
2. Temporary versus permanent
3. Forceps may be needed for loading and insertion

4. Loop versus slit lamp

v. Currently Available Punctal Plugs on the Market
   1. EagleVision silicone punctum plug
   2. FCI silicone punctal plug(s)
   3. Herrick silicone canalicular plug
   4. Medennium thermo-plastic canalicular plug
   5. Oasis silicone punctum plug
   6. Odyssey silicone punctum plug

vi. Candidates for the Procedure
   1. Dry eye patients
   2. Contact lens wearers
   3. Increase residence time of topical medication – Glaucoma, Infections, etc.
   4. Low Schirmer Test Scores
   5. Dye disappearance test with normal outflow
   6. Failed other treatment options

vii. Insertion / Removal Techniques
   1. Evaluation of upper and lower puncta
   2. Proper sizing

viii. Complications with Punctal Occlusion
   1. Tearing, secondary to chronic dacryocystitis with mucopurolent discharge, inflammation of the eyelid, and/ or epiphora. The lacrimal system should be evaluated for blockage by irrigation before occlusion is performed. It is also reasonable that eye drops of many kinds would be more effective if retained on the surface of the eye, rather than drained into the sinus.

ix. Preferences on plugs
   1. Silicone vs. collagen vs. cautery
   2. Duration of plug
   3. Canalicular vs. Puncta
   4. Role of fenestrated plugs

x. Thoughts on punctal plug drug delivery

5. TrueTear Neurostimulation –
   a. First-ever neurostimulation device in eye care
   b. An easy-to-use and drug-free option to temporarily increase tear production during neurostimulation in adult patients
   c. Provides small electrical pulses to stimulate production of your own natural tears
   d. First “smart” device in eye care with Bluetooth® enabled and connected application
   e. Lacrimal Functional Unit (LFU) maintains a healthy environment for the eye by regulating tear production

i. In response to any external and internal stimuli, LFU communicates with Central Nervous System (CNS)
ii. Sensory signals are carried via afferent neurons from LFU to CNS
iii. Parasympathetic and sympathetic signals are carried via efferent neurons
from CNS to LFU
iv. This afferent and efferent signaling and communication occurs via the
trigeminal nerve

f. Neurostimulation in the nasal cavity targets the trigeminal nerve to trigger the nasolacrimal reflex to emulate the normal neural signals to create a natural tear
g. Benefits
i. State-of-the-art technology
ii. Tiny pulses of energy stimulate tears
iii. Drop-free
iv. Drug-free
v. Safe
vi. Works quickly

6. MGD Treatments –
a. Various instruments available
i. Lipiflow – Thermal pulsation technology to improve Meibomian gland structure and function
ii. Mibo Thermoflo – delivers consistent emissive heat to the meibomian glandular apparatus to external lids
iii. Intense Pulse Light - Non-laser, broad wavelength, high intensity flash of light that is applied using a handpiece that contacts the skin through a sapphire or quartz block. The specific mechanism of action is not well understood, but is believed to be partially due to the thermal heating of the meibum coupled with the therapeutic effects of treating superficial telangiectasia. Energy is absorbed by skin chromophores, leading to lysis, causing only minimal collateral damage to neighboring cells.
b. Lipiflow Thermal Pulsation
i. The procedure centers around the breakthrough Vector Thermal Pulse Technology™ (VTP)
ii. After an initial anesthetic drop, no drugs are required for the procedure
iii. The LipiFlow system safely delivers therapeutic energies to the meibomian glands while protecting the delicate structures of the patient's eye
iv. As a result, the obstructed meibum is liquefied and pushed up and out of the gland orifices

7. Treatment and Management –

a. Which comes first? DED or MGD Treatments?
b. What role does insurance play?
    i. Covered vs. Non-covered services
c. What is your protocol?
d. International Task Force Recommendations
e. TFOS DEWS II Impact

References

1. Stapleton F, Alves M, Bunya VY, et al. TFOS DEWS II Epidemiology Report. Ocul Surf. 2017;15(3):334-365.
2. Venturino G, Bricola G, Bagnis A, Traverso CE. Chronic Blepharitis; Treatment Patterns and Prevalence. Invest Ophthalmol Vis Sci. 2003;44(13):774.
3. Palmares J, Delgado, L, Cidade M, et al. Allergic conjunctivitis: a national cross-sectional study of clinical characteristics and quality of life. Eur J Ophthalmol 2010; 20(2): 257 – 264.
4. Yu J, Asche CV, Fairchild CJ. The economic burden of dry eye disease in the United States: a decision tree analysis. Cornea. 2011;30(4):379-387.