Rapidly Changing Landscape of Refractive Technologies

Mile Brujic, OD, FAAO
mile.brujic75@gmail.com
419-261-9161

Summary

Refractive technologies are evolving quickly. From the diagnostic technologies to the treatment options we have, practitioners have a plethora of options. This course will highlight advancements in the arena of refractive technologies.

Learning Objectives

1) Understand diagnostics in refractive technologies
2) Discuss treatment advances in refractive technologies
3) Understand the applications to improve patient care

Course Outline

1) Anterior segment optical coherence tomography
    a. Corneal pachymetry
        i. Allows for corneal thickness
        ii. Contemporary technologies measure 10mm diameter
        iii. Measures
            1. Total thickness
                a. Thinnest in center
            2. Stromal thickness
                a. 90% of total corneal thickness
            3. Epithelial thickness
                a. 10% of corneal thickness
                b. Expect even thickness
                c. Post LASIK thickening
                d. Dry eye irregularities
                e. Fuch's endothelial dystrophy
                f. Epithelial basement membrane dystrophy
        iv. Variance in expectation in these layers can cause poor refractive outcomes
        v. Discuss pachymetry scan and risk for keratoconus
            1. Monitor overtime with keratoconus patients
            2. Discuss relationship with refractive outcomes
    b. Corneal topography
        i. Anterior surface topography
        ii. Posterior surface topography
        iii. Best fit sphere with anterior and posterior corneal surface

    c. Anterior segment imaging
        i. Assessment for large refractive irregularities
        ii. Infrared imaging capabilities
    d. Posterior segment
        i. Rule out reasons for reduced BCVA
2) Higher order aberrations
    a. Objective measurements
        i. Automated through advanced refractive technologies
        ii. Measures at different pupil sizes
        iii. Simulates low light level vision
    b. Subjective measurements
        i. Patient views small spherical target
        ii. Refraction is performed while patient views the target
        iii. Can more accurately refract at a higher level of precision
    c. Pupil control
        i. Larger pupils expose more higher aberrations
        ii. Corneal scars and lenticular changes can lead to higher order aberrations
        iii. Reducing pupil dilation can improve vision
            1. brimonidine
3) Light and myopia control
    a. Dopamine is released in the retina
    b. Is stimulated by melanopsin which is a photopigment
    c. Melanopsin is stimulated by blue light
    d. In a dopamine shortage, myopia progression is likely
    e. General recommendations to prevent myopia progression
        i. One hour outside a day
    f. New technologies
        i. Will deliver fixed amount of blue light on the optic nerve head
        ii. Done through a virtual reality head set
        iii. Early evidence suggestions choroidal thickening and a reduction in myopia progression
4) New myopia progression options
    a. Controlled concentration of atropine
        i. Atropine at concentrations for myopia progression management needs to be compounded
        ii. Unfortunately is unstable
        iii. Newer formulation of atropine will be more stable
    b. Ophthalmic lenses
5) Pharmaceuticals for presbyopia
    a. Reduction in pupil size reduces blur circle and increases a patients depth of focus
    b. Improves near vision
    c. A variety of pharmaceuticals that are being studied

        i. Pilocarpine
        ii. Carbachol
        iii. Aceclidine
        iv. Phentolamine
        v. Brimonidine

6) Advances in contact lens optics
    a. Size of optical zone
    b. Higher order aberration control
    c. Manipulating the size of the optical zone
        i. Scleral lens
            1. Fixed lens surface that doesn't move with blink
            2. Can increase size of optic zone in the lens
7) Ocular surface opportunities
    a. Be certain that the ocular surface is optimized
    b. Assure meibomian glands are functioning appropriately