Alternative and Non-Traditional Contact Lens Uses

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Course Description:

The use of contact lenses has expanded beyond the correction of simple refractive errors. Sub-specialties in eye care have created the need for non-traditional uses of contact lenses that not only aid the treatment and management of ocular conditions but also medically improve quality of life through novel technologies such as virtual reality and more. This course aims to showcase the alternative and non-traditional uses for contact lenses throughout eye care and medicine. Illustrations through case examples will be given to provide insights on when to prescribe these contact lens therapies and devices.

Learning Objectives:

1. Learn about the unique modalities of contact lenses used to manage and treat ocular conditions such as ocular surface disease, binocular vision, myopia management, low vision, and migraines/traumatic brain injury.

2. Identify patient candidates for non-traditional and alternative contact lenses and helpful prescribing techniques
3. Discuss recent and future developments in contact lens technology, including ocular drug delivery and monitoring devices, and virtual reality.

Objectives:

I. Introduction
    a. Authors and disclosures
II. Binocular vision
    a. Patching for pediatric amblyopia
        i. Optical fogging (high plus)
        ii. Opaque patch contact lens
    b. Elimination unilateral diplopia/polyopia
        i. Monocular Diplopia
            1. Scotogenic contact lenses
                a. Creates smaller central scotoma
                b. Preserves peripheral fields
            2. Opaque patch contact lens
                a. Opaque lenses that cover horizontal visible iris diameter
                b. Opaque lenses that cover the sclera in cases of scleral thinning
        ii. Binocular Diplopia
            1. Corneal GP and Soft Lenses may be prism ballasted
                a. Asymmetry may induce prismatic effect
            2. Scleral lenses provide prism in optic zone
                a. Base Down
                b. Other Directions
                    i. Lens must be rotationally stable with custom design
III. Low vision
    a. Contact Lens Telescopes
        i. Reverse Contact Lens Telescopes
        ii. Future developments
            1. Lenses that generate magnification when stimulated by polarized light
            2. Lenses that switch between normal and magnified vision generated by winking
    b. Contact Lens Microscopes
    c. Nystagmus
        i. Dampens nystagmus frequency

d. Photosensitivity
    i. Colored Lenses Translucent and Opaque
        1. Achromatopsia
            a. Red lenses used for rod monochromats (more common condition)
            b. Magenta lenses used for blue cone monochromats (X-linked, less common)
        2. Aniridia
        3. Albinism

IV. Migraine & Traumatic brain injury
    a. Triggers Photosensitivity
        i. Translucent Colored Lenses

V. Sports Vision
    a. Visual Enhancement of Objects
        i. Translucent Colored Lenses

VI. Color deficiency
    a. Custom translucent colored lenses that alter the wavelength of light transmitted
    b. Allows individuals to pass Ishihara color plate test

VII. Myopia management Beyond Orthokeratology and multifocal (MF) soft lenses
    a. Day Time Wear Gas Permeable (GP) Lenses with Front surface MF
        i. Scleral Lenses
        ii. Corneal GP Lenses
        iii. Hybrid Lenses

VIII. Orthokeratology
    a. Molding for Irregular Astigmatism
        i. Post Laser in-situ keratomileusis
        ii. Non-progressive early keratoconus?
    b. Combined with Corneal Crosslinking
        i. Longer lasting effects?

IX. Drug delivery lenses
    a. Impregnated Soft Lenses
        i. Glaucoma
            1. Act as delivery system for ocular anti-hypertensive drops
        ii. Allergic Conjunctivitis
            1. Soft lenses that contain 0.019mg ketotifen for 12-hour allergy relief
    b. Scleral Lenses with medicated vaults
        i. Ocular Surface
            1. Serum tears and preservative free therapeutics
            2. Cryopreserved membranes in lens vault for patients with scarred lids
            3. Anti-VEGF treatments

ii. Bacterial Infections

X. Corneal Transplantations
   a. Soft lenses and Custom Scleral Lenses
      i. Synthetic Scaffolding for limbal epithelial stem cell transplantation

XI. Contact lens advanced technologies and monitoring devices
   a. Soft Lenses with Electronics
      i. Glaucoma
         1. Monitors intraocular pressure with changes in corneal curvature
      ii. Diabetes
         1. Monitors blood sugar levels
   b. Custom Scleral Lens with Electronics
      i. Virtual reality
         1. Augmented reality lenses providing information only visible to wearer
      ii. Low Vision Uses
         1. Camera technology to project visual image directly onto retina

XII. Conclusions