

SCLERAL LENS SPECIAL APPLICATIONS

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Course Description:

This presentation will discuss the diverse applications of scleral lenses beyond vision correction, including piggyback scleral lenses, oblate designs for keratoconus, scleral lenses for ptosis, drug delivery, prism correction, low vision, and optic decentration for fitting.

Learning Objectives:

- 1- To provide valuable insights into the many special applications of scleral lenses.
- 2- To demonstrate scleral lens versatility and potential for improving the vision and quality of life of patients with various ocular conditions.
- 3- To show their utility in drug delivery.

Outline:

- 1- Introduction
- 2- Special applications to be discussed
 - a. Piggyback
 - b. Oblate design for keratoconus
 - c. Oblate design for prolate cornea to reduce high minus power
 - d. Ptosis
 - e. Prism to correct tropias
 - f. Drug delivery
 - g. Low vision
 - h. Optic decentration for fitting purposes
- 3- Piggyback
 - a. Conventional piggyback system: Scleral lens over the soft lens
 - i. Insufficient vault
 - ii. Photophobia

- iii. Initial handling issues
 - iv. Midday fogging
 - v. Allergy to the lens material
 - b. Reverse piggyback system: Soft lens over the scleral lens
 - i. Occlusion therapy
 - ii. Wettability
- 4- Oblate design for keratoconus
 - a. Decentered cone
 - i. Avoid touching the apex
 - ii. Reduce central clearance and increase oxygen transmissibility
 - iii. Reduce lens minus power
- 5- Oblate design for prolate corneas with high myopia
 - a. Reduce lens minus power
 - i. The BOZR in keratoconus may be steeper, and the post-lens layer will become increasingly convex, adding more plus power to the lens system.
 - 1. Higher minus power to compensate for this plus power
 - ii. Reduce image minification, impacting the quality of vision.
 - iii. Reduce HOAs
 - 1. Scleral lenses often exhibit inferior and temporal decentration, resulting in a prism effect and increased high-order aberrations (HOAs), particularly spherical aberration and coma. With a significant increase in lens power, the HOAs also increase.
 - 2. A lens with a high negative power, the size of the optic zone diameter decreases. In case of lens decentration with a large pupil diameter, the junction between the optic zone and the outer curve can lie in the pupil area, causing an increase in high-order aberrations.
- 6- Ptosis
 - a. Presentation of clinical cases
 - b. Enhance visual function
 - c. High sagittal height
 - d. Considerations on oxygen transmissibility
 - e. Shell inclusion
- 7- Drug delivery
 - a. Methods
 - i. Polymer mix
 - ii. Coating
 - iii. Solution absorption
 - b. Benefits of scleral lenses
 - i. Overcome the limitations of eyedrops
 - ii. Extended residence time
 - iii. Decreased pulsatile delivery
 - c. Challenges
 - i. Controlled delivery
 - d. Improve localized delivery to the anterior and posterior segment
 - i. Contact Lens Drug Delivery Systems Currently in Development

- ii. Seasonal allergic conjunctivitis
 - 1. Antihistamine extended release
 - 2. Reduced symptoms by half compared to control
 - 3. Etafilcon A with 0.019 mg ketotifen
- iii. Glaucoma
 - 1. Latanoprost
 - 2. Prostaglandins
- iv. Inflammation
 - 1. Dexamethasone
- v. Anti-inflammatory
 - 1. Ketorolac
- vi. Antibiotic
 - 1. Moxifloxacin
- vii. Scleral lenses
 - 1. Persistent epithelial defects
 - a. With non-preserved antibiotics
 - b. Fortified non-preserved antibiotics
 - 2. Corneal neovascularization
 - a. Anti-VEGF agents
 - 3. Chemical burn
 - a. Stem cells on a scleral lens carrier
 - 4. Wound healing
 - a. Stem cell coating

8- Prisms

- a. Horizontal prisms case reports
 - i. Challenges in lens stabilization
- b. Vertical prisms case reports
 - i. Techniques for lens stabilization

9- Low vision

- a. Aesthetic purposes
- b. Telescope in the optic zone
- c. Considerations on oxygen transmissibility

10- Optic decentration

- a. Front optic zone to enhance visual performance when adding:
 - i. Multifocal optics
 - ii. Wavefront-guided optics
 - iii. Front surface eccentricity
- b. Back optic zone decentration to improve fitting without affecting optical performance.
 - i. In decentered keratoconus, a lens may touch the cone and present excessive clearance in the opposite quadrant:
 - 1. Avoid peripheral touch in the cornea
 - 2. Reduce clearance in the opposite quadrant

11- Conclusion and discussion of the future of scleral lenses, including advancements in materials and designs that may further enhance their special applications.