Scleral Lens Troubleshooting and Complications Management

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Disclosure Statement: We consult for many companies – see next slide.

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Financial disclosure for Stephen Byrnes
In the past year I have received honoraria and support from:
Bausch + Lomb
Art Optical
Blanchard Contact Lens
Viscon Contact Lenses
Menicon

Record Baseline Photos of Anterior Segment
David R Baseline

Scleral Lens Fitting Objectives – Vault the Cornea

Evaluating Venting
Judging Lens Clearance

Evaluating the Landing Zone

Application of the Scleral Lens

1. Head position
2. Eyelid retraction and immobilization
3. Maintaining fluid in the lens
   a. Non-preserved sterile saline vs. gel
   b. NaFl for diagnostic fitting?
4. How to hold the lens
   a. Tripod finger method
   b. “O” ring
   c. Suction cup with or without suction
   d. Balancing on one finger
5. Bubbles
   a. Recognition – Optical distortion
   b. Burning and Stinging
   c. Mirror appearance

Insertion Bubbles

Removal of the Scleral Lens

1. Use of plungers and suction cups
2. Lift out and away
3. Place device at location of first venting – for least traumatic removal
4. Rotate lens 360 to 720 degrees while lifting - if adherent
5. Indent sclera to break suction
6. Scissors Method
4. Pry off with fingernail

Poor Vision – Tears and Coatings

1. Lens surface disruption
   a. Lipid or protein coatings
   b. Make-up and moisturizers
   c. Lens surface non-wetting
2. Distorted lens optics
3. Tear Film Debris behind the lens
Poor Vision - Refractive

1. Uncorrected refractive error with contact lens in place
2. Pinhole test
3. Retinoscopy
4. I-Pad with EyeChart Pro app - Random Letters/charts at 8 Ft

2. Residual Refractive Error Causes
1. Lens flexure – over-keratometry
2. Toric peripheral fitting curve
3. Residual astigmatism
   1. Internal astigmatism
   2. Unstable / off axis front toric astigmatic correction
3. Tilted Optics creating higher order aberrations
   1. Aspheric Optics

Poor Vision – Anterior Segment Pathology

1. Corneal scarring, striae or epithelial disruption
2. Corneal edema
   a. Stromal edema
   b. Microcystic edema
3. Corneal dystrophy

Poor Vision – Anterior Segment Pathology

Cataracts

Poor Vision – Posterior Segment Pathology

1. Glaucoma
2. Vitreous degeneration
3. Retina
4. Optic nerve

Comfort 5/10 after 3-4 h

The Lens is Touching the Cornea
Solving Poor Comfort due to Corneal Touch

1. Use a lubricating non-preserved artificial tear on application
   a. Fill bowl
   b. Add 3-4 drops to NP Saline
   c. Possibility of corneal scarring similar to corneal lenses with apical bearing

2. Increase the Sag of the lens to Vault Cornea
   a. Adjust power if Base Curve changes
   b. May have a change in fit of the peripheral fitting curve as more of the mass of the lens is supported by the peripheral landing zone

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**The Conjunctiva:**

1. Is red
   a. Conjunctival hemorrhage
   b. Conjunctival congestion
   c. Conjunctival inflammation

2. Is white
3. Has a compression ring
4. Is billowing at the limbus

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**Conjunctival Blanching**

**Conjunctival Injection and Inflammation**

secondary to impingement
The Conjunctiva is Billowing / Tenting

Conjunctivochelasis

Localized Impingement

3 & 9 Injection

The Conjunctiva Beyond the Lens
Lissamine Green Staining

Giant Papillary Conjunctivitis
Reading the Compression Ring

Fuzzy Wuzzy Was a Bear...

What's behind lens # 1?

Make-up in the Fluid Layer and on the Lens Surfaces

Removing Protein Coatings
Verifying Toric PCs – Is the Dot on the Flat or Steep Meridian?

Toric Fitting Zone on Eye

Std – Flat 1 Toric Periphery

Std – Flat 1 Toric Periphery

Acute Corneal Hydrops

Microcystic Edema
Understanding Oxygen Available at the Corneal Surface

The oxygen permeability of a lens material is referred to as its Dk. The oxygen transmission of a lens is Dk/t.

D = the material diffusion coefficient or how easily oxygen can pass through the material
K = the oxygen solubility
t = the lens thickness

A given lens material will absorb an amount of oxygen governed by its k value, while a higher D will ensure rapid movement through the lens.

The units of Dk are $10^{-11}$ (cm²/sec)(mlO₂/ml x mmHg).

The thicker the lens, the further oxygen has to travel, and this reduces the oxygen transmission from the front of the lens to the back of the lens. The units of oxygen transmissibility are $10^{-9}$ (cm/sec)(mlO₂/ml x mmHg).

Furrow “Staining” and Conjunctival Tenting

Neovascularization from Adhering Corneal GP CL Regresses with Scleral GP Paradox

Halos Around Lights

Corneal edema due to lack of O₂
Dk/T
Sleeping / napping

Non-preserved Sterile Saline
Preserved Multipurpose Solution A

Preserved Multipurpose Solution B

Jill H - Keratoconus
OD form fruste  OS moderate Keratoconus

Evaluating tear layer and tear flow
Evaluation the Fluorescein Pattern
Corneal Lens
Summary

- Scleral lenses have a unique set of problems
- Avoid many problems by careful lens fitting
- Scleral lenses provide gp lens optics with comfort equal to or better than soft lens
- Vault the cornea
- Align to the sclera minimizing conjunctival bearing
- Patient education is a continuous process