SCLERAL LENS ASSESSMENT AND FITTING

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INTRO TO SCLERAL LENSES
POLL QUESTION 1

• How familiar are you with scleral lenses?

A. I fit scleral lenses in my practice all the time

B. I have fit a scleral lens in my practice before, but do so rarely

C. I have not yet fit a scleral lens in my practice, but have fit on colleagues/attended a scleral lens workshop

D. What’s a scleral lens?
WHAT IS A SCLERAL LENS?

- Rigid gas permeable material
- Designed to vault over irregular or diseased ocular surfaces
- Holds a liquid reservoir of non-preserved saline
- Lands on the sclera
## CORNEAL GAS PERMEABLE VS. SCLERALS

<table>
<thead>
<tr>
<th>Corneal</th>
<th>Sclerals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas permeable</td>
<td>Gas permeable</td>
</tr>
<tr>
<td>Rests entirely on cornea &lt;10mm</td>
<td>&gt;6mm larger than HVID</td>
</tr>
<tr>
<td>Corneal touch</td>
<td>Corneal vault</td>
</tr>
<tr>
<td>Movement</td>
<td>Semi-seal, limited</td>
</tr>
<tr>
<td>Lens awareness</td>
<td>Minimal lens awareness</td>
</tr>
</tbody>
</table>
TYPES OF SCLERAL LENSES

- Defined based on scleral lens landing, *not on lens diameter*
- Full scleral lens: mini scleral vs large scleral (HVID)
- Corneal clearance or saggital depth
- Anatomical barriers (pterygium/pingueculae/lids)

<table>
<thead>
<tr>
<th>Lens Type</th>
<th>Description</th>
<th>Definition of Bearing Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corneal</td>
<td></td>
<td>Lens rests entirely on the cornea</td>
</tr>
<tr>
<td>Corneo-scleral</td>
<td></td>
<td>Lens rests partly on the cornea, partly on the sclera</td>
</tr>
</tbody>
</table>
| Scleral     | Mini-Scleral  
*Lens is up to 6mm larger than HVID* | Lens rests entirely on the sclera               |
|             | Large Scleral  
*Lens is more than 6mm larger than HVID*  |                                                  |
SCLERAL LENS ZONES

- **Optic Zone**
  - Houses the optical system
  - Base curve
  - Power
    - Optical Toricity
    - Asphericity/multifocality
  - Controls sagittal depth

- **Transitional/intermediate zone**
  - Controls sagittal depth/vault
  - Can be reverse geometry

- **Haptic zone**
  - Landing zone on the conjunctiva
  - Supports the weight of the device

- **Back Toric Lens Design**

Courtesy Dr. Andrew Mcleod
SCLERAL LENS
INDICATIONS

1. Vision Correction
2. Protecting the Ocular Surface
3. Providing comfort
VISION CORRECTION

1. Primary Ectasias

2. Post-surgical and/or secondary ectasias

3. Corneal Irregularity

4. Refractive error

Keratoconus
Penetrating Keratoplasty
Radial and Astigmatic keratotomy
PROTECTING THE OCULAR SURFACE

1. Exposure keratopathy
2. Lagophthalmos
3. Trichiasis and entropion
4. Neurotrophic corneal disease
5. Persistent Epithelial Defects

Image courtesy: Boston Sight
PROVIDING COMFORT

1. Advanced ocular surface disease:
   a. Sjogren’s
   b. Graft versus host disease
   c. Steven’s Johnson Syndrome
   d. Ocular Cicatricial pemphigoid

Graft Versus Host Disease: confluent SPK and Filaments

Graft Versus Host Disease: after 3 hours of wear

Image courtesy: Boston Sight
APPLYING SCLERAL LENSES
CHALLENGES

- Determination of clearance values
- Fitting can be time consuming
  - Re-makes and frequent visits
- Complications
  - Debris in the reservoir and surface issues
  - Patient comfort
- Centration
INITIAL LENS SELECTION

Fitting Guide

Slide courtesy: Andrew McLeod
LENS PREPARATION

• Wash your hands

• Wash and clean lenses as with GP lenses

• Both plungers available
  – Large DMV plunger- Insertion
  – Small DMV plunger-Removal
PATIENT PREPARATION
CENTER LENS
SUCTION
FILLING THE LENS
NON-PRESERVED SALINE
INSERTION

- Place on a large or medium DMV suction cup OR use the tripod method using the thumb, index finger and middle finger to hold the lens.

- Fill with non-preserved saline solution.

- Instruct patient to lower head so that the face is parallel to the floor.

- Hold both upper and lower lids wide open.
  - Patient may hold their lower lid.
INSERTION

• Move Quickly!

• Squeeze the suction cup so that the lens releases onto the eye.

• Have the patient close their eyes. Make sure the patient has a paper towel under their eye to catch the overflow of saline and fluorescein during insertion.

• Check for bubbles
  – If present, remove the lens and reinsert again.
PATIENT POSITION
PRACTITIONER POSITION
MOVE QUICKLY
MOVE QUICKLY
PLUNGER VS TRIPOD METHOD

SCLERAL LENS APPLICATION AND REMOVAL

PLUNGER METHOD

ALWAYS HAVE CLEAN HANDS WHEN HANDLING SCLERAL CONTACT LENSES. A MIRROR AND A CLEAN TOWEL UNDERNEATH THE AREA CAN BE HELPFUL. ALWAYS START WITH THE SAME EYE TO AVOID MIXING UP LENSES.

APPLYING LENSES

Rinse lens with ScleralFil™ preservative free saline solution.
Set the lens on the center of the plunger.
Fill the lens with ScleralFil, forming a convex shape. Don’t let it overflow.

Bend over and look straight down. While holding your eyelids wide open, set the lens on the center of your eye.

Blink. Blot excess solution. Make sure that the lens is centered and comfortable.

Air bubbles can cause discomfort, poor vision, and unusual glare. If any air bubbles are present, reapply.

REMOVING LENSES

Insert 1-2 drops of ScleralFil to help loosen the lens.
Pull your lower eyelid down and then up to get it under the lower edge of the lens.

While leaning over a towel, lift the edge of lens with your other hand.

THREE-FINGER METHOD

APPLYING LENSES

Rinse lens with ScleralFil™ preservative free saline solution.
Center the lens on your thumb and index and middle fingers.

Center the lens on your thumb and index and middle fingers.

Blink. Blot excess solution. Make sure that the lens is centered and comfortable.

Air bubbles can cause discomfort, poor vision, and unusual glare. If any air bubbles are present, reapply.

REMOVING LENSES

Insert 1-2 drops of ScleralFil to help loosen the lens.
Pull your lower eyelid down and then up to get it under the lower edge of the lens.

While leaning over a towel, lift the edge of lens with your other hand.

LENS REMOVAL

- Small DMV suction device
- Have patient look down with his head upright and against the headrest.
- Hold the patient’s upper eyelid.
- Place the suction cup on the superior portion of the lens, as close to the lens edge as possible.
- Gently rock the lens to release the suction between the lens and eye.
- Have the patient look up after suction is released to remove the lens off the eye.
LENS REMOVAL
LENS REMOVAL
POLL QUESTION 2

Which of the following is true regarding applying/removing a scleral lens?

A. Use a small plunger to apply, large plunger to remove

B. Cutting off the large plunger helps with centration when inserting the lens

C. There are no fixation devices available for patient’s with limited dexterity

D. Tripod or three-finger method is an alternative for patient’s fearful of the plunger method
POLL QUESTION 3

If you see a bubble under the scleral lens, what should you do?

A. Push-up method to dissipate the bubble
B. Nothing; as the lens settles, the bubble will dissipate on its own
C. Remove the lens, fill the lens bowl with NP saline and reapply lens
D. Rotate the lens until the bubble dissipates
ASSESSING SCLERAL LENSES
STEPS FOR ASSESSING A SCLERAL LENS

- Determining central clearance values
- Evaluating the mid-peripheral zones
- Evaluating the limbal zone
- Evaluating scleral landing zone
- Overall centration
- Movement
DETERMINING CLEARANCE VALUES

- **Slit lamp technique**
  - Optic section, white light, ~45deg angle
  - Measured in microns

- **Reference**
  - **Cornea**: avg central thickness 530 microns, avg peripheral thickness 650-microns
    - Irregular corneas; ex. ectasias---Keratoconus (unpredictable)
  - **Central lens thickness**
    - Better reference point
    - Must know thickness

- **Human eye capable of observing 25 microns**+
- **Fluorescein**
  - Easier to evaluate
- **Underestimation by ~50 microns with slit lamp technique vs. ultrasound technique (Yeung et al 2014)**
LENS ASSESSMENT

- **Central Clearance/“Vault”**
  - Distance from posterior lens to anterior corneal surface
  - Measure in white light
  - Optic section
  - Reference
  - Corneal thickness
  - Lens thickness
  - 100-300 um clearance
  - Gross evaluation, using blue light

- **Midperipheral to Limbal vault** - Tapering from center
  - Do not want the lens to rest on the limbal stem cells
LENS ASSESSMENT

• Scleral Alignment
  – Prevent air/debris from entering
  – Monitor both edge and limbal junction (elbow)
  – Bearing
    • Blanching
    • Compression
    • Impingement
  – Excessive/Edge lift
    • Air bubbles entering
    • Debris under lens
OTHER ASSESSMENT FACTORS

- Centration
  - Toric PCs?
- Movement
  - Sodium Fluorescein
SCLERAL LENS FIT SCALES

To accurately estimate the amount of vaulting (clearance) underneath the posterior surface of a scleral lens necessitates a reference point for comparison. Although some have suggested corneal thickness for the reference, we prefer the center thickness (CT) of the lens itself which will be listed on the manufacturer’s invoice. In each of the examples below, the CT is 0.30mm (300 microns). In most scleral lens designs, the ideal amount of clearance is about 300 microns.
SCLERAL LENS FIT SCALES

CENTRAL VAULTING

50 Microns
150 Microns
300 Microns
500 Microns
600 Microns

LIMBAL VAULTING

None
Good
Moderate

EDGE RELATIONSHIP

Severe Lift with bubble
Good Edge - Aligned
Mild Impingement
Severe Impingement
Severe Impingement

Authors: Josh Lotoczky, OD; Chad Rosen, OD; Craig W. Norman, FCLSA
Contact Info: CraigNorman@ferris.edu
EDGE PROFILE

Scleral alignment
Blanching/Impingement
Edge Lift

Images courtesy Boston Sight
POLL QUESTION 4

Which of the following best describes this fit pattern?

A. Excessive Edge Lift
B. Adequate Scleral alignment
C. Impingement
D. Blanching
USING ANTERIOR SEGMENT OCT WITH SCLERAL LENSES

- Exact and accurate measurements of central vault, mid-peripheral, and limbal vault
- Edge profile
- Lens to sclera relationship: lens landing
301 µm in cornea

166 µm in cornea

Ideal

Touch
USING ANTERIOR SEGMENT OCT

- **Corneal/Lens Thickness**
  - Corneas that are prone to edema (s/p PK, low endo cell count, etc)
    - Monitor pre- and post- scleral or hybrid lens wear
  - Len thickness of unknown lenses
    - Center thickness vs peripheral lens thickness
      - Are we getting max oxygen permeability?

- **Lens Edge**
  - Patient discomfort but SLE findings not conclusive
    - Edge profile blunt? Impingement? alignment?
Good scleral edge alignment
SEVERE IMPINGEMENT
POLL QUESTION 4

Estimate the central clearance of this lens based on this slit lamp photo. Assume central thickness of the lens is 250 microns.

A. 300 microns
B. 500 microns
C. 100 microns
D. 25 microns
OTHER CONSIDERATIONS

- Back surface asymmetry → toric peripheral curves
- Stable fit prior to over-refraction
- Evaluate for tear exchange
- Make sure to remove lenses and check ocular surface with fluorescein in office at follow up visits
  - Minimal corneal staining
  - Consider toxic reaction in cases of diffuse punctate epitheliopathy
  - Impingement staining
SCLERAL LENS CARE

• GP care solutions or peroxide systems should be used for scleral lenses

• Care should be taken when cleaning and rinsing lenses due to their fragile nature.

• Rub each side (inside and outside) with cleaner for 15 seconds
SCLERAL LENS CARE

• GP solutions should be rinsed from the scleral lens with sterile unpreserved saline solution prior to insertion.

• Long Term Storage: Dry

• Diagnostic scleral lenses should be cleaned and disinfected properly with either a GP disinfecting solution or a hydrogen peroxide system, then stored dry.
SCLERAL LENS CARE

• Plungers
  – Soap and water clean
  – Hydrogen peroxide
  – Alcohol wipes

• Supplemental Products
  – Artificial Tears
  – Cleaners (Miraflow, Progent, Boston 1-Step Enzymes)

• Review: Lens care and insertion/removal at each visit
Healthy Scleral Contact Lens Habits

Congratulations on your new Scleral contact lenses! To ensure continued success with your Scleral lenses, review these healthy lens habits.

1. Wash your hands thoroughly with soap, rinse and dry them before handling your lenses.
2. Do not use tap water to clean or handle your lenses or to clean the case.
3. Your solution has been chosen specifically for your type of lens. Do not change without discussing this with your eye care professional. In addition, contact lens solutions should not be used after the expiration date.
4. To maintain comfortable lens wear, rub your lenses after removal with the recommended cleaning solution to remove protein, oil and make-up.
5. Prior to insertion, the lens should be filled with a non-preserved filling solution to avoid corneal toxicity. Pay close attention to the expiration date.
6. Store brand solutions are often old formulations of solutions and may not be compatible with your type of lens.
7. Always recap your solution bottle after each use.
8. Do not sleep with scleral lenses.
9. If you have a spare pair, it should be stored dry and in a case until needed. Before using, clean the lens(es) with the cleaning solution and store in soaking solution overnight prior to application.
10. Before using any type of eye drop (medication or artificial tear), ask your doctor if the lenses need to be removed.
11. Completely empty the solution in the lens case every day. Never add more solution if there is solution already there.
12. Clean the case with your soaking solution and let air dry completely, uncapped end upside down, on a paper towel. It is recommended to replace your case at least every 3 months.
13. Healthy lens wear should not induce redness, discomfort, or visual disturbance. If you have any concerns, remove your lenses and consult your eye care professional.

Your next contact lens check-up is:

Association of Optometric Contact Lens Educators
www.aocle.org

This form is intended as an educational tool and must not take the place of your doctor’s advice. The AOCLE, its officers, and members are not responsible for any loss, injury, or damage resulting from using this form.
USE YOUR RESOURCES!

- Training Videos
- Certifications
- Consultants
  - Troubleshooting
  - Ordering lenses

Courtesy: Dr. Andrew Mcleod
REFERENCES:


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