Basic Strategies for Clinical Success with Scleral Contact Lenses

Susan J. Gromacki, O.D., M.S., F.A.A.O., F.S.L.S.

Diplomate:
Cornea, Contact Lenses and Refractive Technologies
The American Academy of Optometry
Basic Strategies for Clinical Success with Scleral Contact Lenses

Susan J. Gromacki, O.D., M.S., F.A.A.O., F.S.L.S.

Disclosures: AccuLens, Alcon, Alden, Allergan, Bausch + Lomb, Bioscience Communications, CIBA Vision, Contamac, CooperVision, Blanchard, Danker, Focus Labs, GPLI, Inspire, Johnson & Johnson, Pilkington Barnes-Hind, Sauflon, SLES, Sunsoft, SynergEyes, Valeant, Visionary Optics, Vistakon, Wesley-Jessen, and Westcon
Basic Strategies for Clinical Success with Scleral Contact Lenses

Susan J. Gromacki, O.D., M.S., F.A.A.O., F.S.L.S.

Thank you
Basic Strategies for Clinical Success with Scleral Contact Lenses

How to Grow a Scleral Lens Practice
How to Grow a Scleral Lens Practice

Patient recruitment:
• Referrals from other providers: MDs (OMD, PCP, rheumatologist,) other ODs -word of mouth, letters, emails, and/or social media
• Your own patient population
Indications

- KC/ Post-LASIK ectasia
- Keratoglobus
- Pellucid
- Post-refractive surgery
- Post-corneal transplant
- Trauma/scarring
- Dry eye
- Corneal dystrophies and degenerations
- High astigmatism
- Normal corneas

Photo contributed by Roy Rubinfeld, MD
Normal Corneas

- ***Fast-growing scleral segment
- Patients that we used to fit in corneal GP lenses
- Dry Eye
- Soft toric failures (dryness, rotation)
- ATR corneas
  - Corneal GPs: reduced stability
- High corneal cylinder
- Multifocals (less movement, better centration and stability)
Benefits and How to Communicate Them

Eye health
- Vaults cornea, protecting it rather than scraping it
  (Research: Korb, 1982; CLEK. 2007: scarring in KC)
- Excellent for dry eyes (bathes the cornea in fluid all day long)
- Also, unlike corneal GP lenses: no 3+9 staining

Comfort
- Increased diameter
  - Edges tuck under the eyelids
  - Do not feel them with the blink
Benefits: Communication

**Comfort**

- Land on the Sclera (Conjunctiva)
  - Increased centration and stability
  - Increased retention
  - No foreign bodies under the lens after insertion
  - No need to “piggyback”
Benefits: Communication

Improved Vision

- **GP material**
- **Lacrimal lens “fills in”**
  corneal irregularities, providing optical correction
- **Increased centration**
- **Less movement**
  - High cyl. soft toric patients → fluctuating vision

**Optic zone size**

**Vault:**
- Less corneal dessication, improving vision
- Less spectacle blur post-lens removal

Pre-Fitting

**Testing:**

1. Refraction (92015)
2. Slit lamp evaluation (scarring, SPK)
3. HVID
4. Corneal topography/tomography (92025)
5. Optical coherence tomography (OCT) (92132)
6. Corneal pachymetry/endothelial cell count (76514)
The Fitting Process

Office Flow

- Master Insertion and Removal
- Dip Fluorescein strip
- Initial assessment with hand-held Co blue filter
  - Insertion bubbles
  - Poor fit
    - Slightly steep OK, but NOT too flat
    - Pressure on cornea can affect O-R

Photo courtesy of AccuLens, Inc.
The Fitting Process: Lens Selection:

- Follow the Fitting Guide
  - Each lens brand is different
- Goal: sagittal depth greater than the sagittal height of the eye. Lens should land gently on the sclera without corneal or limbal contact.
- Diameter >2 mm larger than corneal diameter. E.g. HVID 11.8 mm, start with 15.8 (11.8 +2 mm on each side = 15.8 mm) or larger
- Elevation: topographical elevation, anterior segment OCT, HVID, side profile, or simply by judging the severity of the condition
- corneal irregularity, lens diameter
The Fitting Process

- Allow Lens to settle for 20-30 minutes
  - Settling Studies:
    - Esen and Toker (*Eye & CL, 2016*): 63 u/ 8 h
      - 80% 1st 4 hours
    - Kauffman et al. (*OVS 2014*) 88-134 u/ 8 h
      - Highest rate 1st 30"
    - Lens variables affect settling (design, parameters)
Precise Lens Fit Evaluation

View the entire lens:
- Center
- Limbus
- Sclera
Limbal Clearance

- First, I use cobalt blue filter to scan the cornea
- Look for any areas of touch
- NaFl should cover the entire cornea, including limbus
  - Can see the green with a white band

Photos courtesy of Blanchard Contact Lens
Limbal Clearance

- Important d/t limbal stem cells
- Touch: SPK
- XS clearance: hypoxia

Photo courtesy of Blanchard Contact Lens
Eliminating Limbal Touch

- Increase OZD/LD
- Custom: increased limbal clearance
- Steepen BC (but may affect central cl)

14.3 mm diameter - Limited limbal clearance
14.6 mm diameter - Improved limbal clearance
White Light, Optic Section

- Confirm any areas of potential touch, (e.g. at limbus, graft junction, cone)

Photo courtesy of Blanchard Contact Lens
White Light, Optic Section: High Mag, High Illumination

Central Clearance
• 100-400 μ (varies per design)


Scleral Lens Fit Scales, MCO. Reproduced with approval of Craig Norman, COT.
Scleral Lens Fit Scales, MCO. Reproduced with approval of Craig Norman, COT.
**White Light, Parallelopiped**

- **Conjunctiva/Sclera:** even bearing 360°
- No impingement of blood vessels (too tight/steep)
- No lift-off (too flat)
The Lens Order: Over-refract

- Spherical 1st
- Spherocylindrical
  - lens flexing?
    - Over Ks, Topo
    - Toric PC
    - Thicker CT
  - Can order Anterior Toric
- Vertex Distance
The Lens Order:

- Specify:
  - BC
  - Sag
  - Limbal curves
  - Peripheral curves
  - Diameter
  - Anything special, e.g. vault over pinguecula
- Doctor calculations, Lab calculators, Lab consultants
The Lens Order:

- **Material:** High Dk (>100)
  - More silicone
  - Typically softer and more prone to scratching
- **CT:** 0.2-.5 mm (usually 0.3+)
  - Too thick: hypoxia
  - Too thin: warpage and breakage
  - Limit WT 12 hours/day (no EW!)
Many scleral lenses, even in high-Dk materials, do not provide sufficient oxygen to the cornea, based on Holden and Mertz’s criteria.


A paper from OVS this year disagrees.


Scleral GP lenses should be fitted with high-Dk materials and without excessive clearance.

Patient Education: The Importance of Scleral Lens Handling and Care
Handling

- Tripod method
- Large suction cup (DMV Corp.)
- Ezi Scleral Lens Applicator (Q-Case Inc.)
- O-ring (#8, hardware stores, GP lens manufacturers)
Special Application

“See Green Lens Inserter”
(Dalsey Adaptives, Springfield, MA)
Lens Application/Insertion

- Wash your hands
- Dry your hands and eyelids with a clean, lint-free towel
- Fill the lens with fluid
- Open both eyelids as widely as possible
- Insert lens with face down, parallel to the horizontal plane, so fluid will stay in the lens

Photo courtesy of Scleral Lens Education Society
Preventing Air Bubbles under the Lens

- Ensure that patient’s head is parallel to the ground
- Fill the lens to its edge or rim
- Refresh Celluvisc (Allergan)

Photo courtesy of Greg DeNaeyer, OD
Removal

• “Above and below” method
  • Same as for small diameter GPs but patient must open wider
  • Pull lower lid down below lower edge of lens
  • Break the suction of the lower lens-conjunctiva with the lower eyelid
  • Be ready to catch the lens as it releases

Photo courtesy of Scleral Lens Education Society
Removal

**Small suction cup/plunger/ DMV®**

- Place drop of saline or AT onto suction cup
- Place suction cup on inferior 1/3 of lens.
- Break suction of lens with inferior eyelid
- Lift up and out simultaneously with the suction cup

Photo courtesy of Acculens, Inc.
Filling the Lens:

**Non-preserved solution**
- Unit-dose 0.9% sodium chloride inhalation/irrigation solution
- Unit-dose artificial tears
  - Dry eye
  - Lenses with minimal clearance
- Large (4 oz.) bottle of saline (Unisol d/c)

**All options are considered off-label by the US FDA**


**Unit-dose 0.9% sodium chloride inhalation/irrigation solution**

- 3 or 5 mm vials
- At pharmacy or online at Amazon.com
- By definition a non-prescription item but some pharmacies require one anyway
  - insurance coverage
  - educate pharmacists on scleral lenses


Gromacki SJ. *Scleral Lens Application: Filling the Lens.* In: Care Solution Corner, *Contact Lenses Today* 2013; September 8:3.
LacriPure (Menicon)

- 2016: first solution FDA-approved for scleral lens insertion
- Unit dose, 0.9% NaCl (non-preserved saline)
  - 5ml vial
- Contains no buffers
- 98 vial box - 7 week supply
**ScleralFil (B+L SVP)**

- 2017: FDA-approved for scleral lens insertion
- 0.9% NaCl, nonpreserved
  - sodium borate and boric acid
- 10 ml bottles, 30 per case
How to Clean and Disinfect Scleral GP Contact Lenses

Gromacki SJ. How Are We Caring for Scleral GP Contact Lenses? In: Care Solution Corner, Contact Lenses Today 2013; June 9:3.


Care

- Clean manually with daily cleaner suitable for GP lenses
- Rinse with saline
- Disinfect with GP conditioning/disinfection solution
- Sensitive eyes:
  - Rinse with nonpreserved saline prior to insertion (less wettable) and/or:
  - Clear Care (may need larger case from Dry Eye Zone)
  - Only FDA-approved with digital rub (except CC Plus)
Rinsing

- US FDA: “Do not expose your contact lenses to any water: tap, bottled, distilled, lake or ocean.”

- Saline
  - multidose preserved
  - multidose non-preserved (Purilens)
    - Potential for contamination
  - aerosol
  - unit dose
    - expensive; tendency to under-rinse
More Information:

- Gromacki SJ. Scleral GP Contact Lens Insertion, Removal and Care. GPLI.info (2014)
- Gromacki SJ. Specialty Contact Lens Care. GPLI.info (2015)
- Gromacki SJ. Corneal and Scleral Contact Lens Care Update. GPLI.info (2017)
Scleral Lens Troubleshooting
Initial Scleral Lens Non-wetting

- Why more frequent?
- Theory: since the lens blank for sclericals is larger than for small corneal lenses, the diamond lathe makes contact with the lens blank for a greater amount of time, thus creating additional heat and resulting in nonwetting

→ present whether plasma-treated or not
Makeup Contamination and Scleral Lenses

Why more frequent?

- makeup wand can more easily graze their front surface
  - thicker (2-5X)
  - protrude more (300u corneal clearance)

Not easily removed with over-the-counter daily cleaners
Eliminate Non-wetting or Deposits

- “Squeegee” lens on eye with Q-tip/DMV and SCL MPS
- Boston Laboratory Cleaner or alcohol-based daily cleaner
  → rinse, rub surface with SCL MPS
- Progent (Menicon)
- Polish
  • All will negate the effect of plasma tx

Order a new contact lens for the patient
Prevent Nonwetting or Deposits

- Order lens with Tangible Hydra-PEG (Contamac)
- Soft coating
  - Reduces deposits
  - Improves wettability
- Warranted for one year
- Only available with certain materials/labs
Under-Lens Fogging/Debris

- Dry eye
- XS Central vault
  - Reduce: Flatten BC, Decrease Diameter, Oblate
  - Flat edge: “path” for debris
    - Steeper or Toric PC
    - Add Refresh Celluvisc to lens bowl
- XS lens movement (2° narrow landing zone)
  - Optimize alignment of landing zone
- Remove lenses mid-day, rinse and refill

When to Use Toric PCs

- Decentration (typically inferotemporal, also d/t lid tension and gravity)
  - Nasal sclera: flatter\(^1\), higher in elevation\(^2\)
- Asymmetric blanching
- Lens flexure
- Debris
- Discomfort
- Larger diameters

2. Ritzmann M et al. Understanding scleral shape with the Eaglet Eye Surface Profiler. GSLS 2015.
Scleral Lens Ingenuity
The Future is Bright!
Thank you!