WOO UNIVERSITY

Scleral Lenses 101

Dr. Karen G. Carrasquillo, OD,
PhD, FAAO, FSLS, BCLA

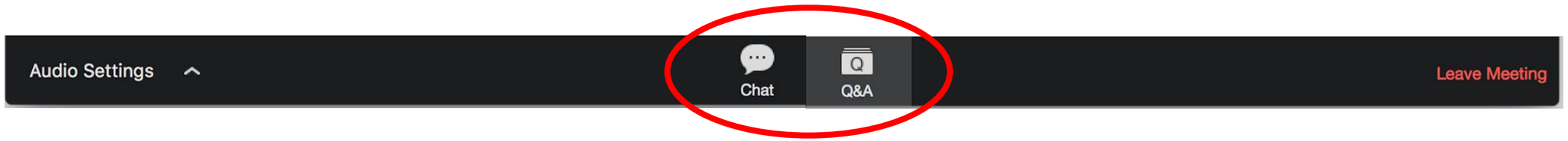
WOO UNIVERSITY

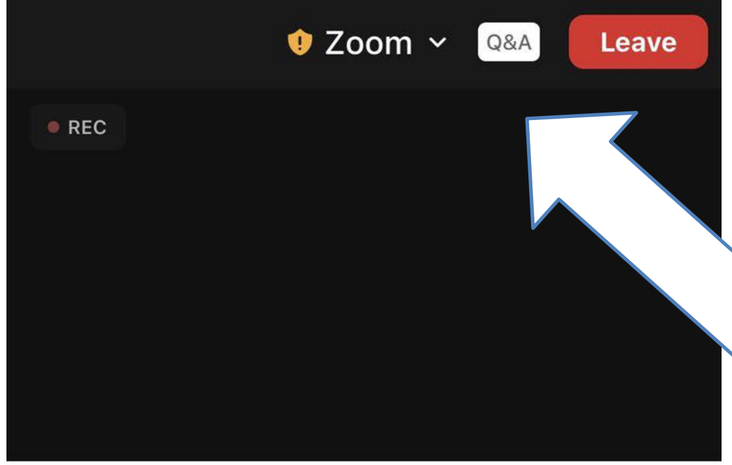
WELCOME!

Host: Dr. Stephanie Woo

This event is supported with an unrestricted educational grant from Bausch and Lomb.

- For a 1-hour webinar attendees must be online for a minimum of 50 minutes
- For a COPE certificate, please fill out the survey link in the chat. Also, the survey link will appear when the webinar ends.
- CE certificates will be delivered by email and sent to ARBO with OE tracker numbers
- **CE certificates will be emailed within 4 weeks**
- Ask questions using the zoom on-screen floating panel





Opportunity to Partner

Optometrists are at the frontline to recommend treatment for cataract and glaucoma patients.

Established relationships with patients

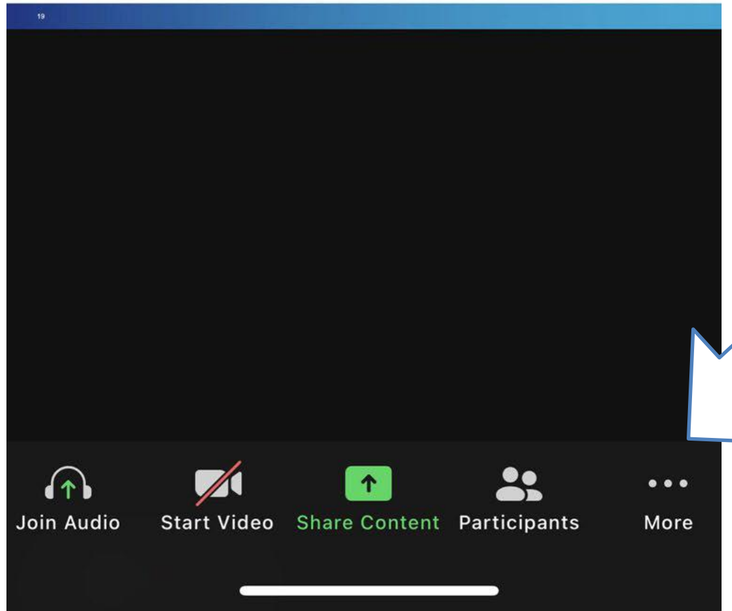
- Ability to inform patients of the best technologies available
- Needs, wants, expectations, and lifestyle

Reduce patient and physician burden

- Cost/pharmacy visits and prior authorizations
- Ocular surface disease and potential effects on visual acuity

Ability to impact patients' post-operative lifestyle

- ONE TIME opportunity during cataract surgery to address a patient's cataract, refractive needs (astigmatism and presbyopia) as well as their glaucoma



Speaker Bio – Dr. Karen G. Carrasquillo

Dr. Karen G. Carrasquillo is Vice President of Clinical and Professional Affairs at BostonSight. In addition, she is an adjunct clinical professor at the New England College of Optometry, an adjunct clinical professor at the school of optometry, MCPHS University, Advisory Board member for the Gas Permeable Lens Institute (GPLI), Fellow of the American Academy of Optometry (FAAO), Fellow of the Educational Society of Scleral Lenses (FSLS), and Fellow of the British Contact Lens Association (FBCLA). She is the founder and Program Chair of FitAcademy, an educational retreat for Cornea and Contact Lens Residents, and is also a planning committee member for the International Congress of Scleral Contacts (ICSC) Meeting and Global Ophthalmic Women (GLOW) meeting.

She is also the author of numerous publications on the therapeutic use of scleral lenses and prosthetic replacement of the eye surface system (PROSE) and is also the author of several patents. Prior to completing her doctorate degree in Optometry and her residency in Cornea and Contact Lenses, she completed a PhD in Chemistry at the University of Puerto Rico and a postdoctoral fellowship in ophthalmological research from the Massachusetts Eye and Ear, Harvard Medical School, in Boston, MA.

Financial Disclosures

- Salaried employee of the nonprofit 501c3 BostonSight.
- No propriety interests in any BostonSight technologies.

Scleral Lenses 101

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WOO UNIVERSITY

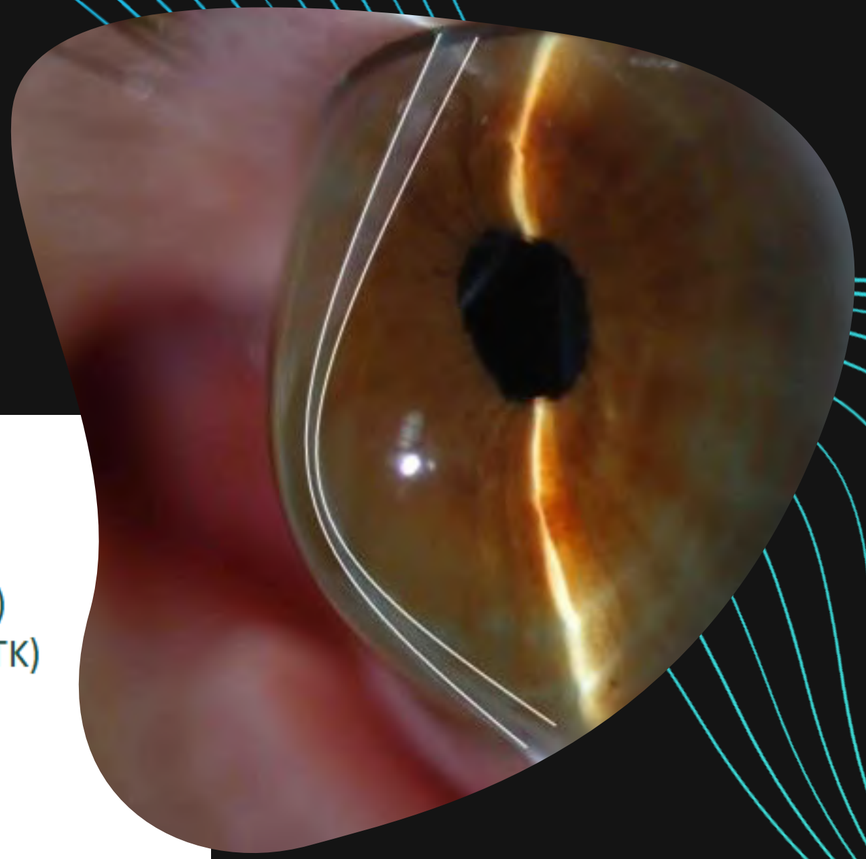
BOSTONSIGHT®

Outline

- Indications
- Poor/Non-Candidates
- Navigating Scleral Shape
- Approaches to Scleral Lens Fitting
- Identifying Patterns of Scleral Toricity
- Special Scleral Lens Applications
- Scleral Lens Applications Tools/Techniques
- Pearls on Patient scheduling/ monitoring
- Why and When to co-mange

Scleral Lens Indications

DISTORTED CORNEAL SURFACE



DEGENERATIONS
- Keratoconus
- Keratoglobus
- Pellucid marginal degeneration
- Terrien's marginal degeneration
- Salzmann's nodular degeneration
- Ehlers-Danlos syndrome

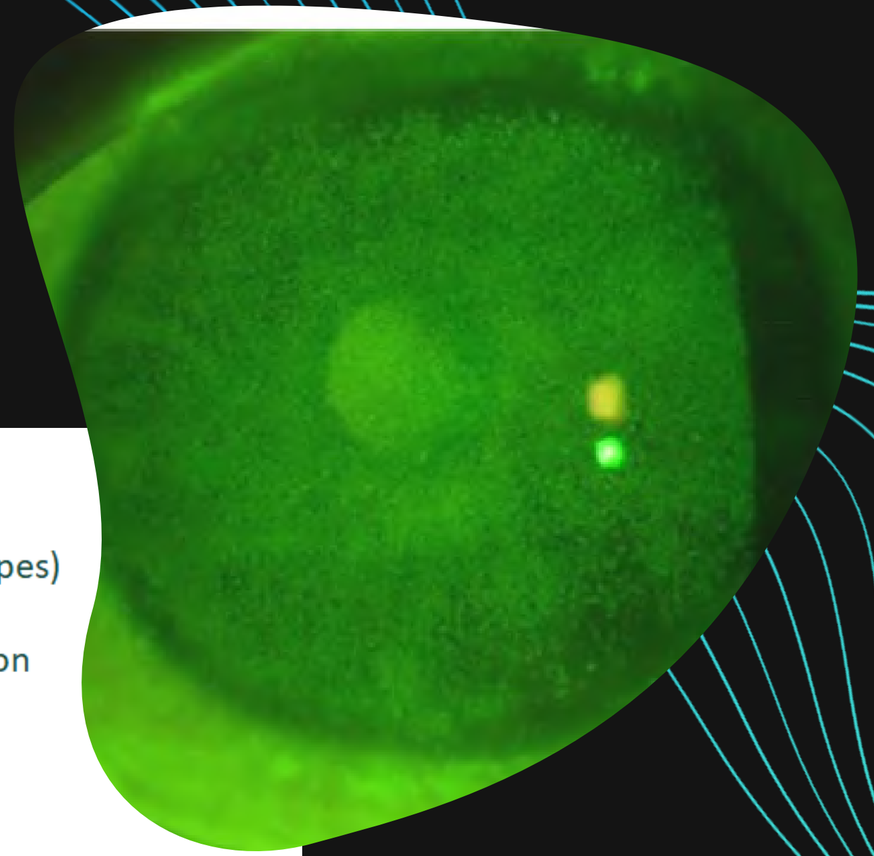
AFTER SURGERY
- Cornea transplant (PK, PKP)
- Radial keratotomy (RK)
- Photorefractive keratectomy (PRK)
- Phototherapeutic keratectomy (PTK)
- Epikeratophakia
- LASIK
- Open globe injury

DYSTROPHIES
- Cogan's dystrophy
- Bowman's dystrophy
- Granular corneal dystrophy
- Lattice corneal dystrophy
- Meesmann's corneal dystrophy

CORNEAL SCARRING
- After infection
- After trauma

Scleral Lens Indications

OCULAR SURFACE DISEASE



DRY EYE SYNDROME
- Ocular chronic GVHD
- Sjögren's syndrome
- History of refractive surgery (LASIK, PKP)
- Rheumatoid arthritis
- After radiation

LIMBAL STEM CELL DEFICIENCY
- Stevens-Johnson syndrome (SJS)
- Aniridia
- Cicatricial conjunctivitis/ocular cicatricial pemphigoid
- Chemical/thermal injury

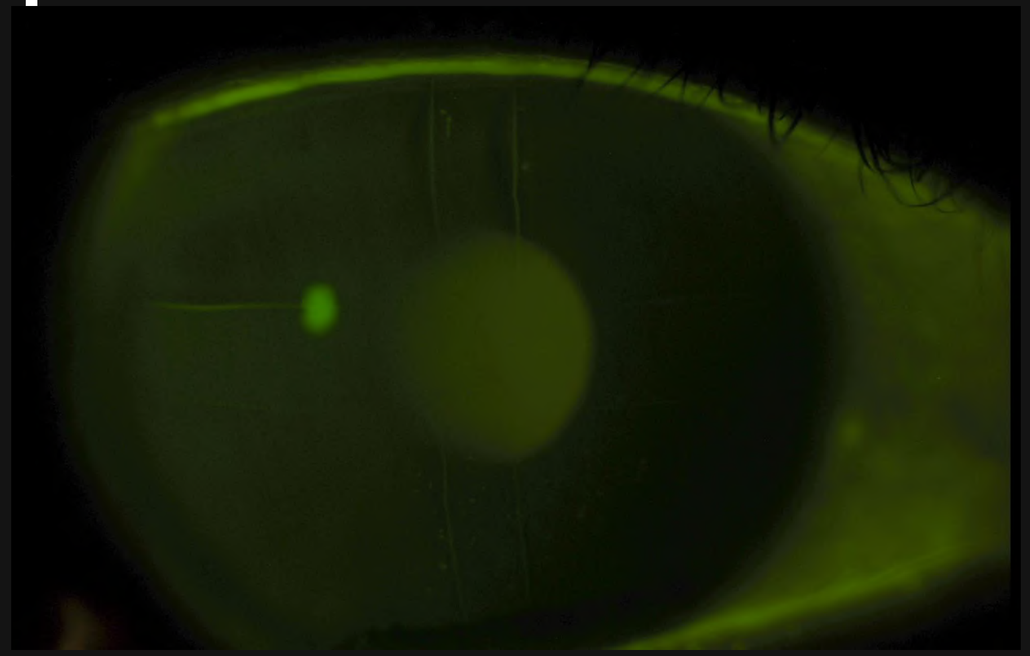
EPIDERMAL OCULAR DISORDERS
- Goldenhar syndrome
- Ectodermal dysplasia
- Atopy
- Epidermolysis bullosa

NEUROTROPHIC KERATITIS
- Herpes zoster (shingles)
- Herpes simplex (ocular herpes)
- Familial dysautonomia
- Trigeminal nerve dysfunction
- Moebius syndrome
- After surgery

CORNEAL EXPOSURE / LAGOPHTHALMOS
- Anatomic
- Paralytic

- Acoustic neuroma

Non and/ or poor candidates



Treatment of Severe Infectious Keratitis With Scleral Contact Lenses as a Reservoir of Moxifloxacin 0.5%

Eduardo J. Polania-Baron, MD, Omar Santana-Cruz, OD, Alejandro Lichtinger, MD, Enrique O. Graue-Hernandez, MD, MSc, and Alejandro Navas, MD, PhD

Purpose: To report the outcomes of using scleral contact lenses as antibiotic reservoirs as a therapeutic approach in a case series of severe infectious keratitis and to discuss the clinical potential.

Methods: This was a prospective consecutive case series study of 12 eyes treated for infectious keratitis at the "Conde de Valenciana" Institute of Ophthalmology. A scleral lens (SL) filled with 0.5% moxifloxacin was used as a reservoir and replaced every 24 hours until epithelization was complete or the culture report and/or antibiogram demonstrated either a microorganism not susceptible to or resistant to moxifloxacin.

Results: The study included 12 eyes of 12 patients (7 women; 58.33%; average age of 63 ± 20.11 years). All patients completed at least 1 month of follow-up. Patients had a diagnosis of infectious keratitis, and the SL was fitted on initial consultation. Of the 12 eyes, 7 had culture-positive bacterial infection, 2 eyes were mycotic, and 3 eyes had no culture growth. In 3 eyes, SL was discontinued because of the lack of response (one eye) and to the presence of mycotic infection (2 eyes). All infections resolved favorably at the final follow-up.

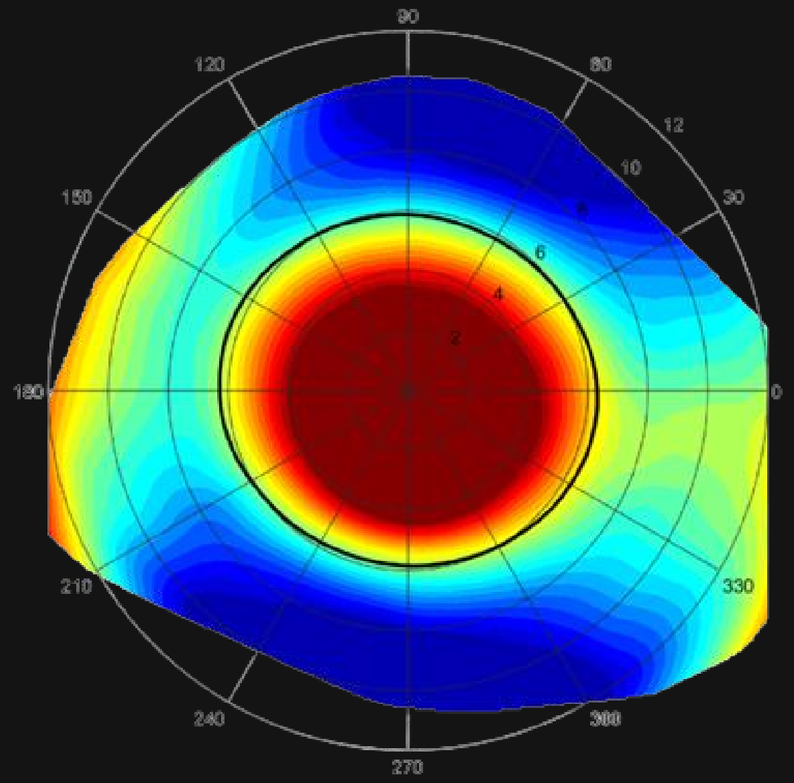
Conclusions: The use of SLs could be an alternative for antibiotic impregnation and treatment of infectious keratitis. No complications or side effects were observed related to the use of the scleral contact lens as a reservoir for the antibiotic. This treatment modality could offer a comfortable treatment for the patient, ensuring good impregnation and maintenance of antibiotic concentrations during

all infectious keratitis cases are caused by bacteria.[2] In general, keratitis is difficult to treat because intraocular drug penetration is partially obstructed by the impermeability of the strong defensive barriers of the eye. The specific anatomy and physiology of the eye also prevents the absorption and penetration of most active drug molecules. Eye drops are very convenient, but most of the medication is diluted with tears and drains rapidly from the corneal surface and cul-de-sac and into the nasolacrimal drainage system. Because of the short residence time of conventional eye drops, frequent instillation of eye drops is essential to maintain high levels of topical drugs for a prolonged period of time,[3–5] particularly in severe corneal infections.

One potential option for prolonged exposure of the cornea to antimicrobial drugs could be the use of scleral lenses (SLs). These are large-diameter contact lenses, usually indicated for the correction of refractive errors when a conventional diameter lens would not fit correctly or comfortably because of the shape or irregularity of the ocular surface. SL can be designed to create different vaults over the corneal surface, thereby allowing for provision of considerable precorneal fluid that could be used to administer different drugs and substances.[6] Some authors have previously described the use of SL as a reservoir system for the treatment of persistent epithelial defects.[7,8] SLs have also been used in the treatment of corneal surface disorders, and they offer the advantage of prolonged and targeted exposure. This type of lens creates a reservoir of artificial tears, autologous serum, or

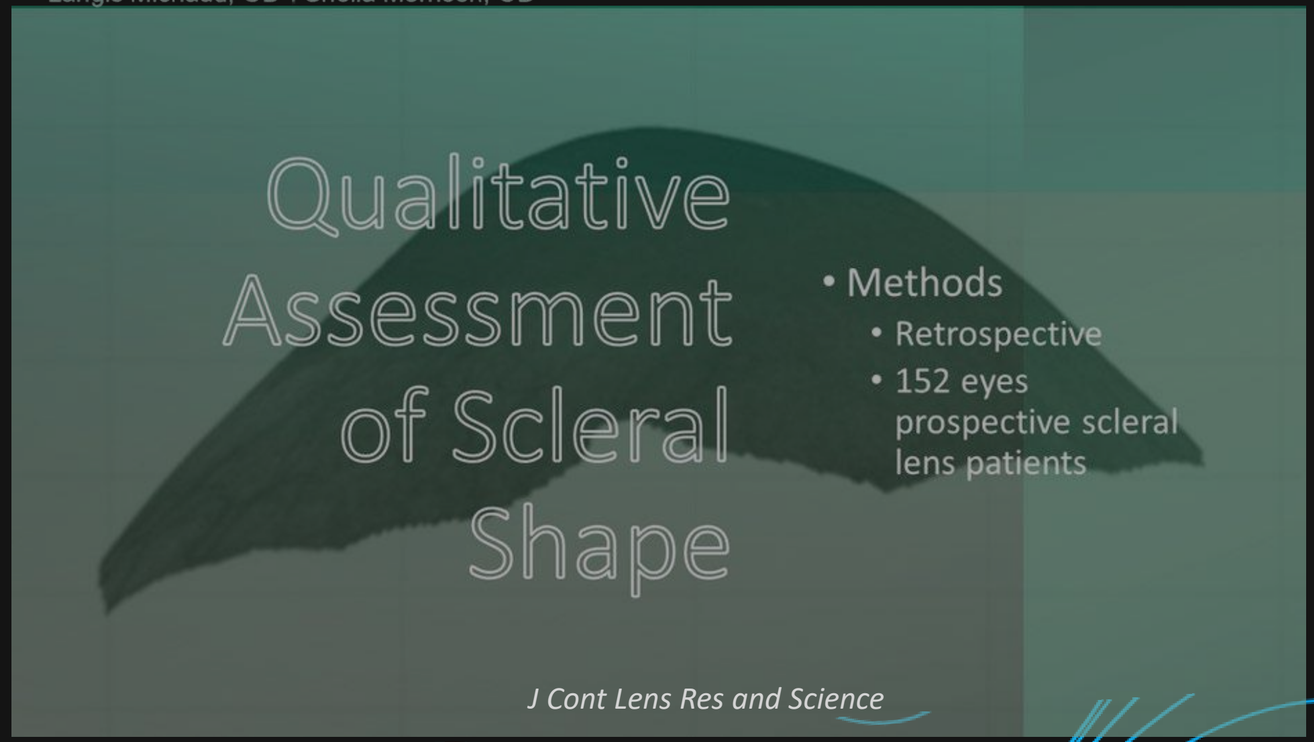
Navigating Scleral Shape

FOLLOWING THE CURVES FOR A BETTER FIT



QUALITATIVE ASSESSMENT OF SCLERAL SHAPE PATTERNS USING A NEW WIDE FIELD OCULAR SURFACE ELEVATION TOPOGRAPHER: THE SSSG STUDY

By Gregory DeNaeyer, OD[1], Donald R. Sanders, MD, PhD[2], Eef van der Worp, OD[3], Jason Jedlicka, OD[4], Langis Michaud, OD[5], Sheila Morrison, OD[6]

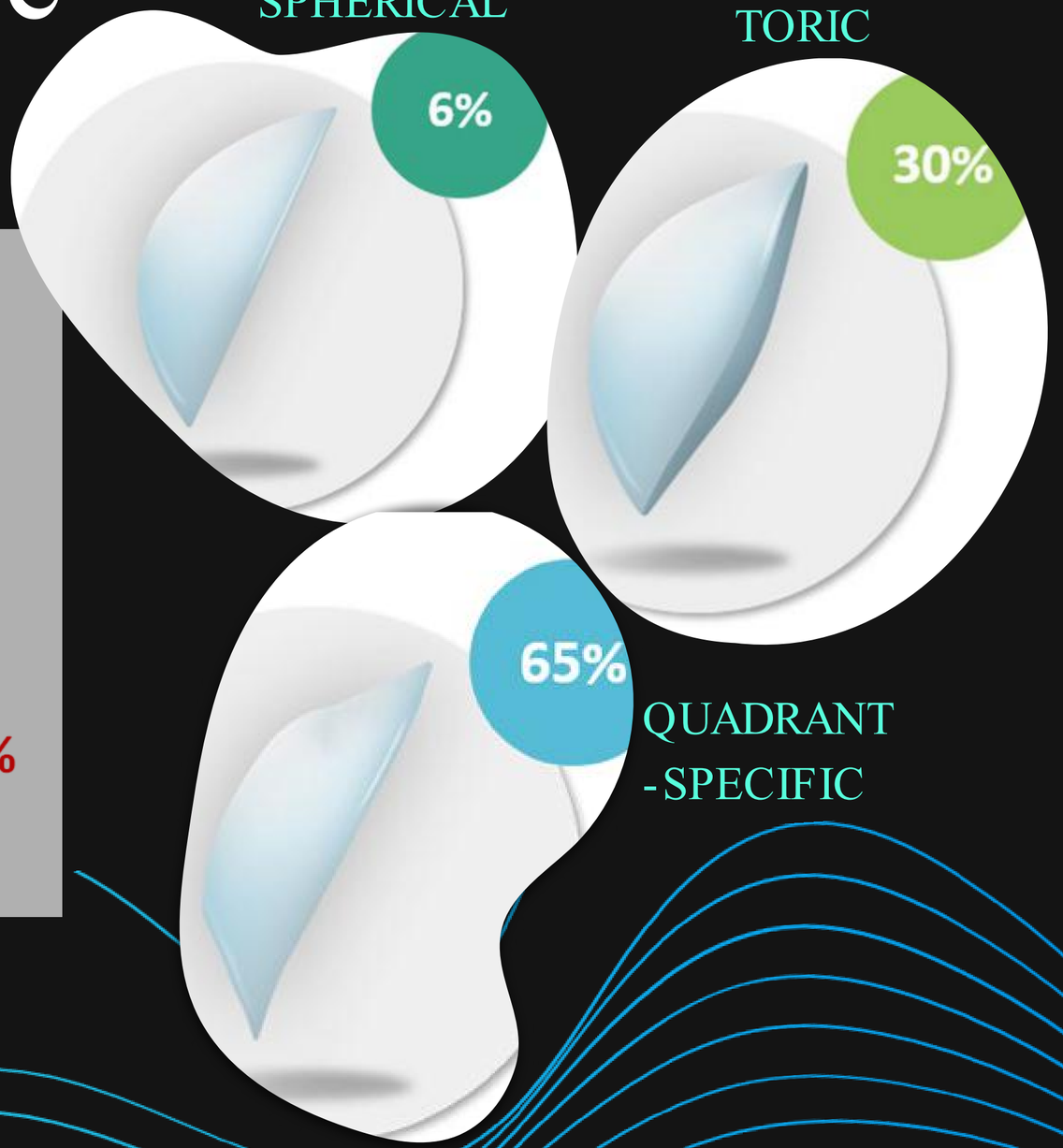


J Cont Lens Res and Science

Navigating Scleral Shape

Table 1 Scleral Surface Patterns Observed in 140 Scleral Lens Patients		
Group	**Pattern Description**	**N(%)**
1	Spherical	8 (5.7%)
2	Toric-Regular	40 (28.6%)
3	Asymmetric High or Low Points	57 (40.7%)
4	Periodicity different from 180°	35 (25%)

65.7%



WAYS TO APPROACH THE FIT AND NAVIGATE SCLERAL SHAPE

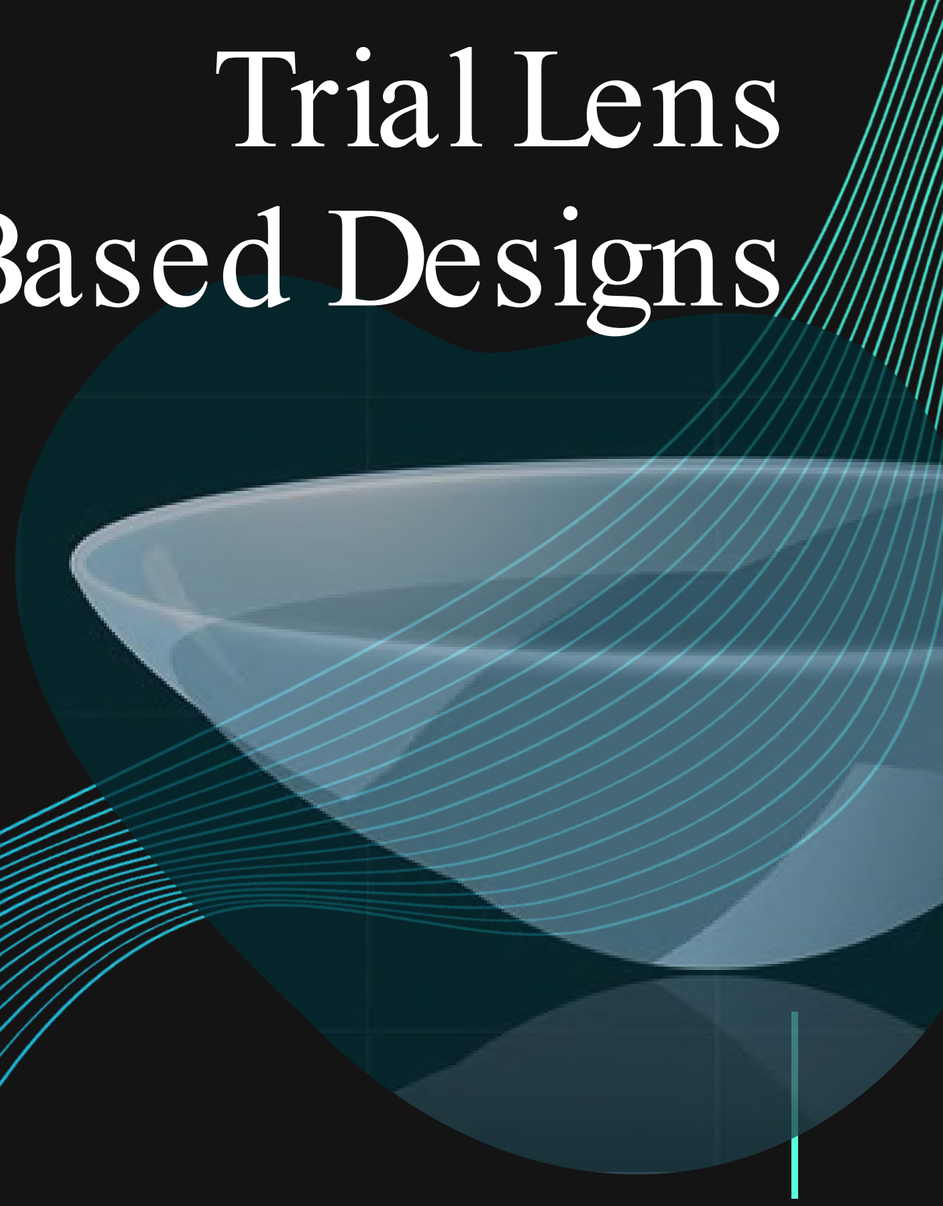
- TRIAL BASED FITTING
- SCLERAL TOPOGRAPHY (IMAGE-GUIDED)
- IMPRESSION MOLDING

Trial Lens Based Designs

Spherical/BC dependent

Toric/ BC dependent/ BC independent

Toric/ Quadrant-Specific Data-Driven



Empirical Based Fitting

Profilometry/Scleral Topography Based

Fluorescence-based:

1. Single direct scan of the ocular surface. Can reach up to 20mm (depending on the scan quality)
2. Stitch-based algorithms (3 images diff gaze/ Stitched together). Can reach up to 22mm (depending on scan quality)

Tomography Based

Scheimpflug tomographer: Does not require fluorescein. First generation required 5 images and then stitching of images. Current generation - single scan. Can reach up to 18mm (depending on scan quality). Some software (manuf labs) extend this capability to up to 20mm.

Impression Molding

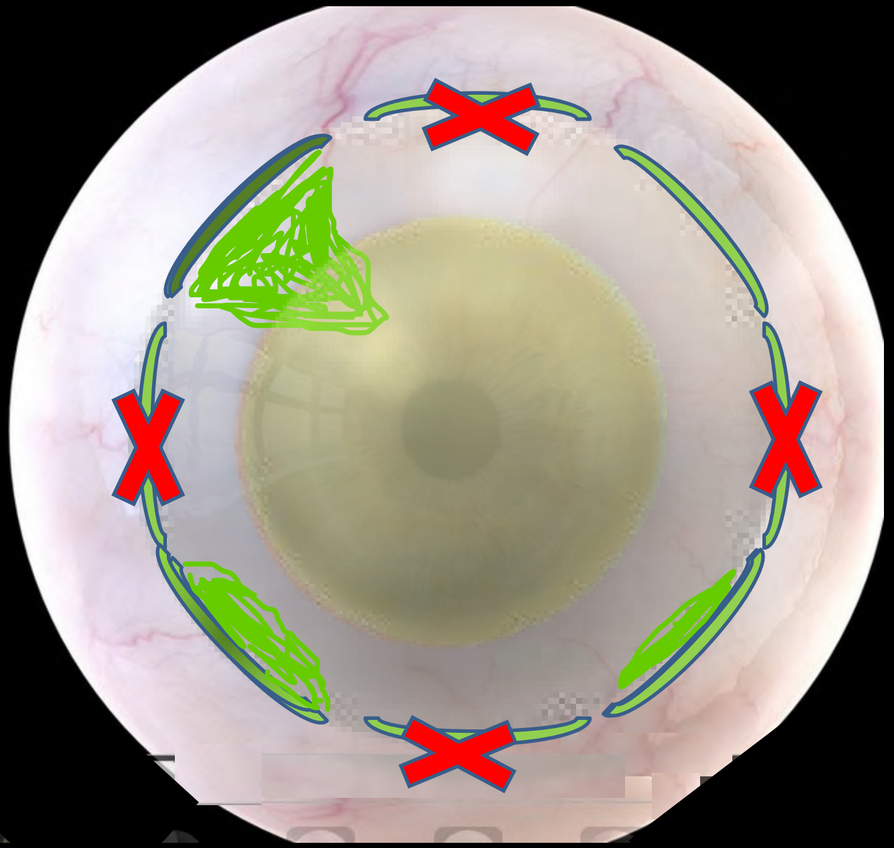
Scan mold and generate 3D image/ data sent to the lab for manufacturing

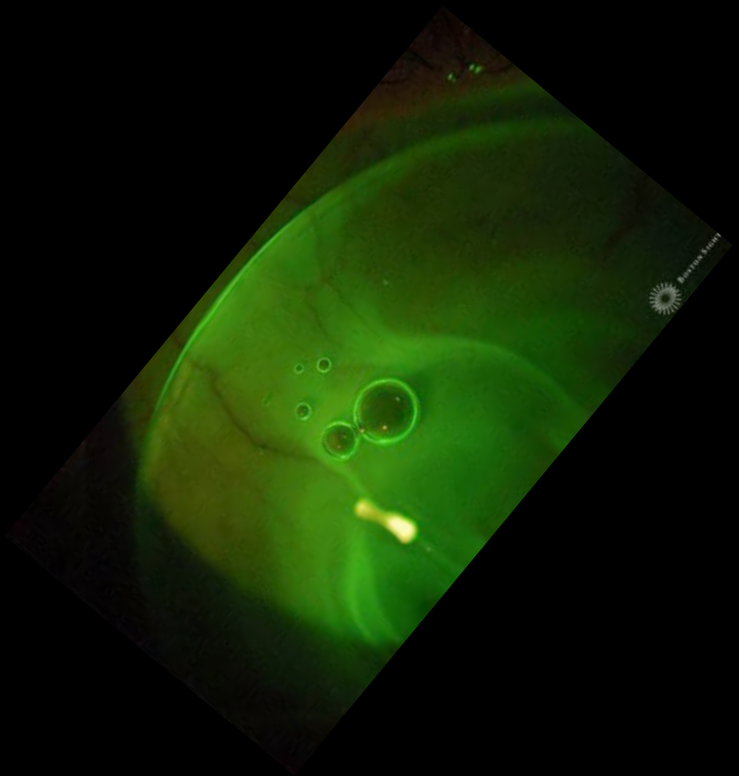
How do we navigate scleral shape without the help of technology

How to power through with trial lenses

NAVIGATING SCLERAL SHAPE

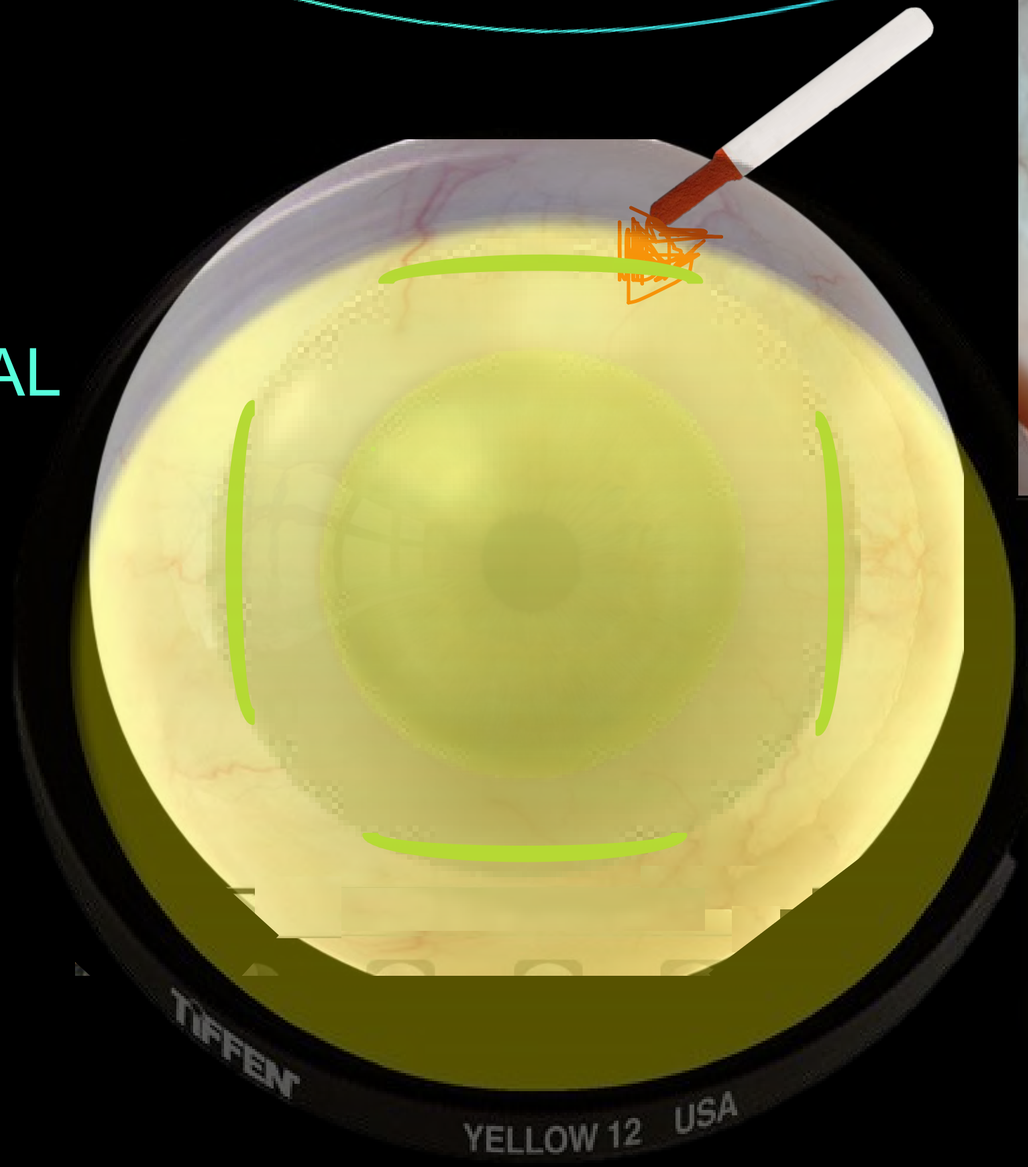
Spherical Trial Lenses
– LENS IN

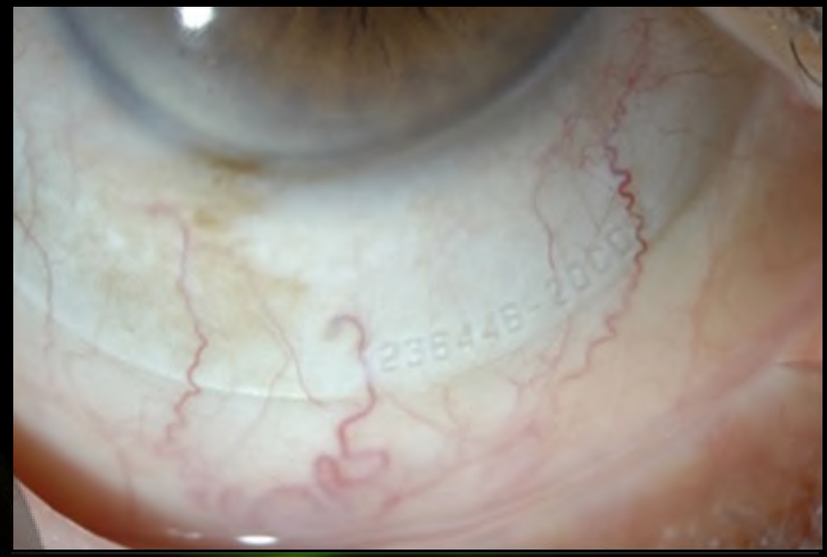


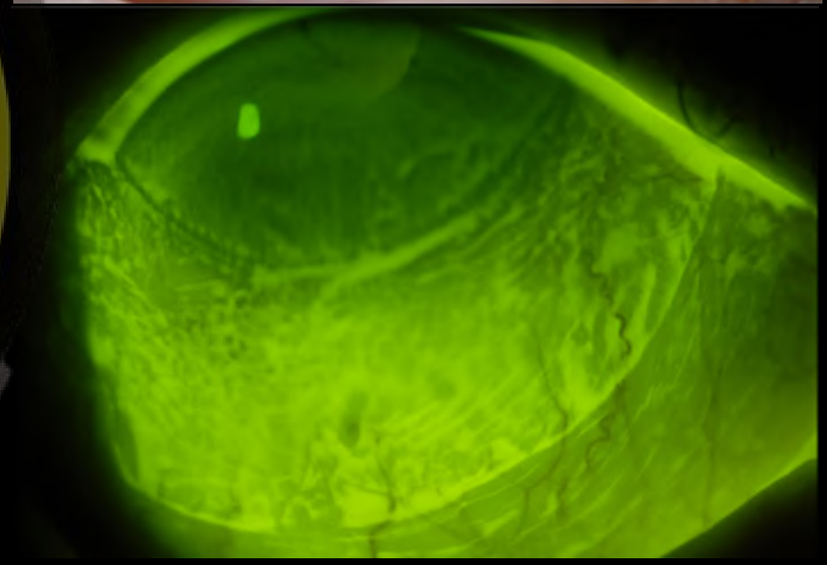


NAVIGATING SCLERAL SHAPE

Spherical Trial Lenses
– LENS OUT

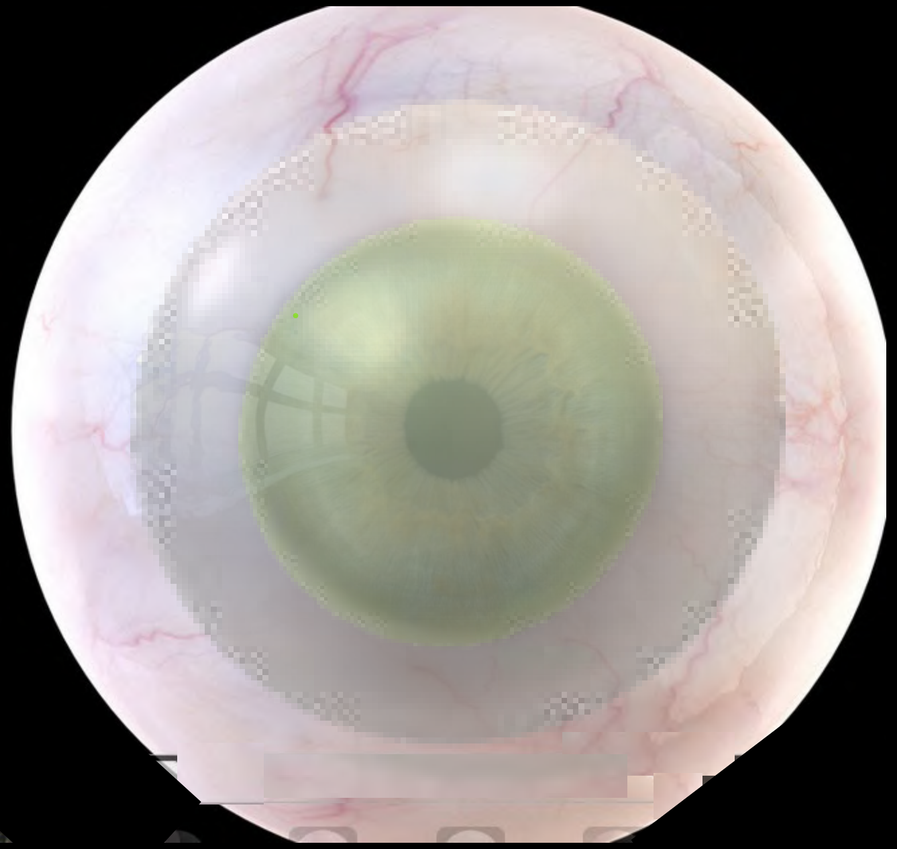


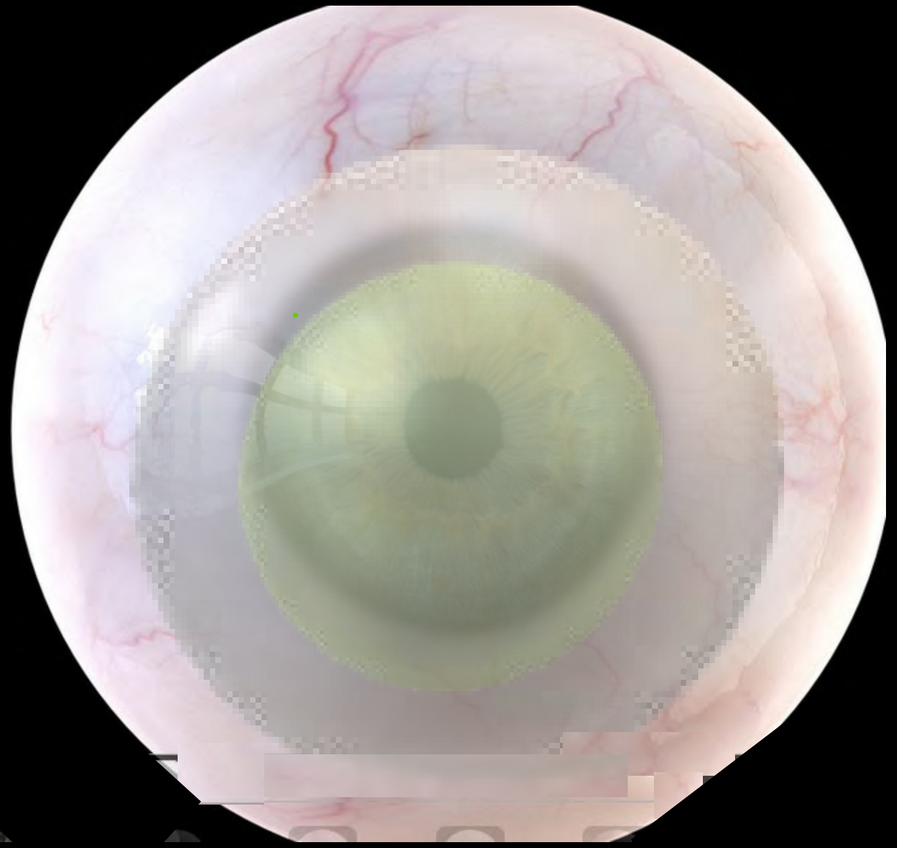




LENS DECENTRATION

Troubleshooting





LENS DECENTRATION

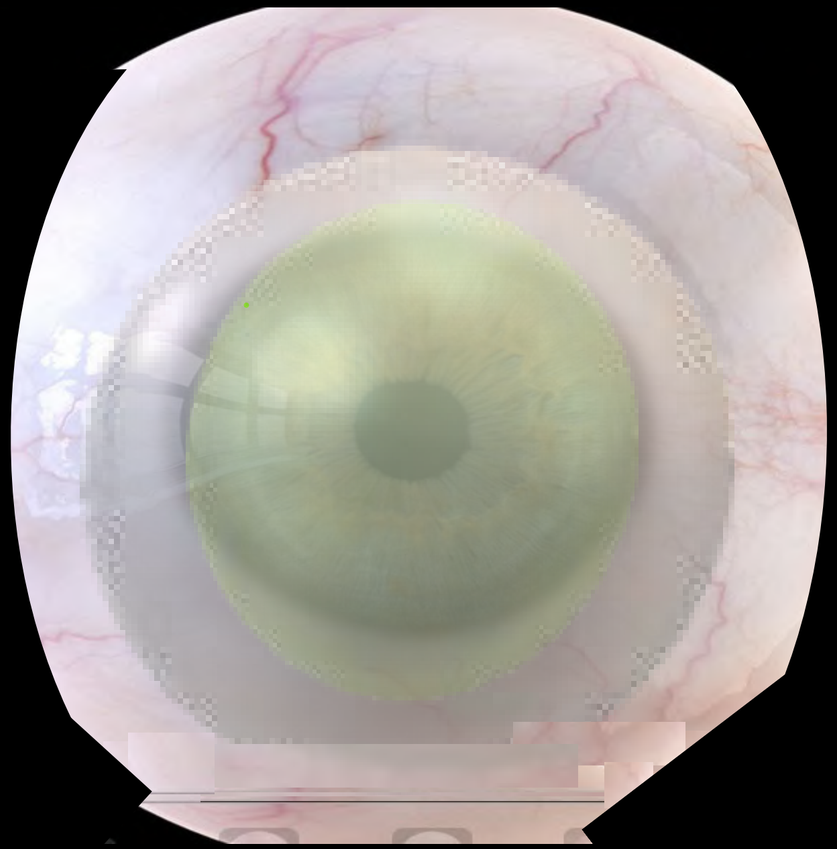
Troubleshooting

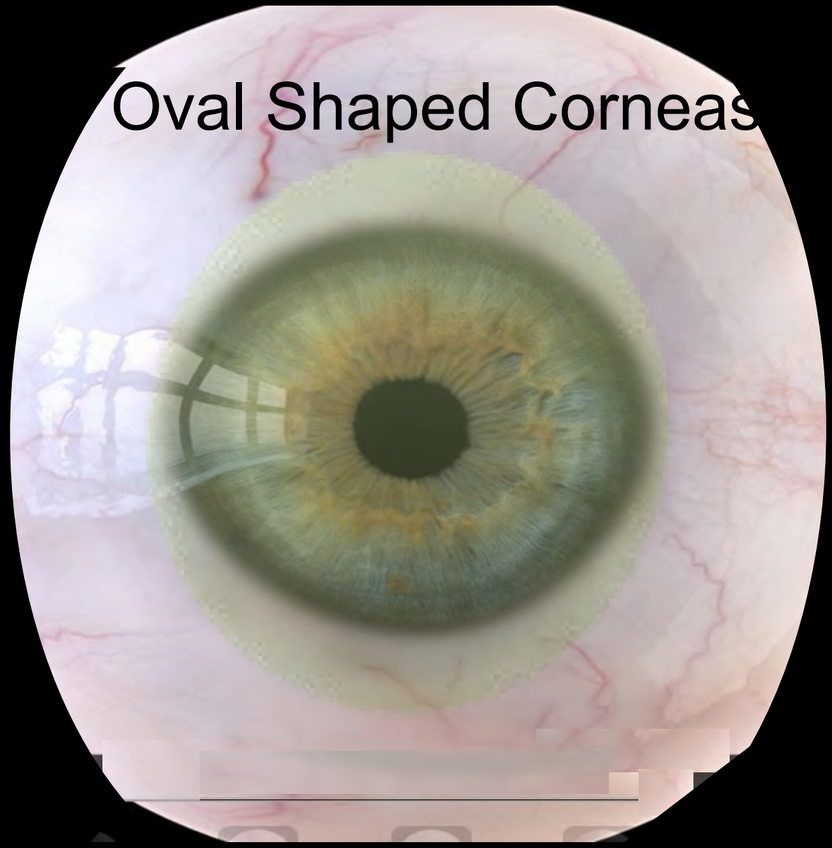
FLAT/LOOSE INFERIOR HAPTIC

Troubleshooting

LENS DECENTRATION
Troubleshooting

Excessive Limbal Clearance
Troubleshooting



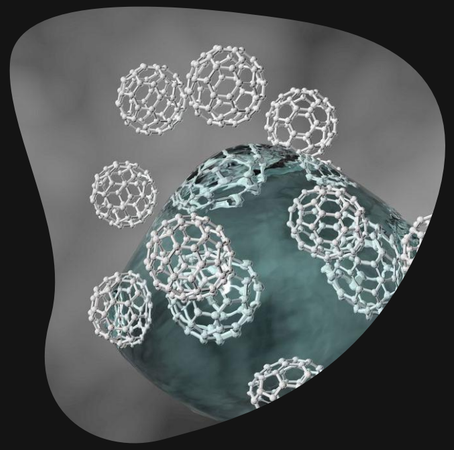


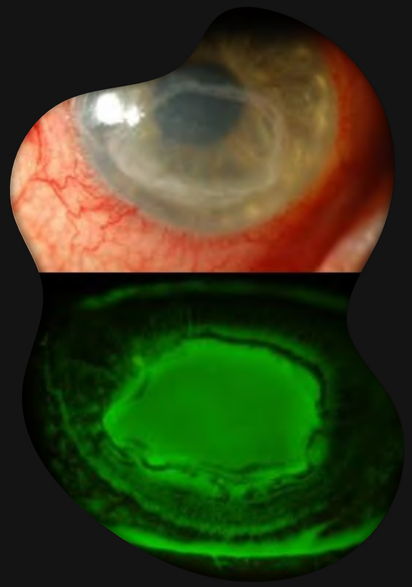
PEARL: GET INTO HABIT OF MEASURING HVID/VVID

Special Applications/Findings

Special Applications

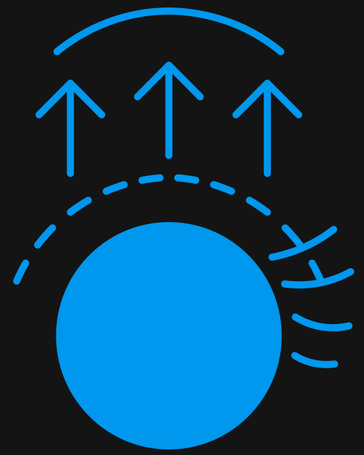
DRUG DELIVERY

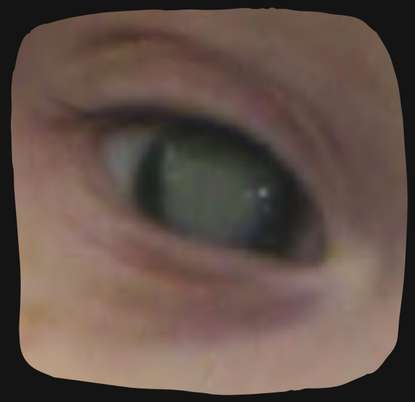




RECALCITRANT PEDS

LID CRUTCH

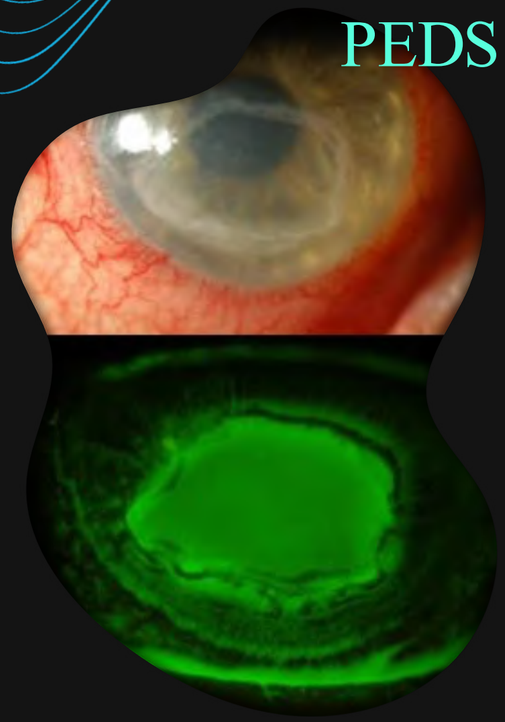




CLEARING OF OPACITIES

HIGHER ORDER ABERRATIONS

RECALCITRANT PEDS



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ORIGINAL ARTICLE

Treatment of Refractory Persistent Corneal Epithelial Defects: A Standardized Approach Using Continuous Wear PROSE Therapy

Jessica B. Ciralsky, MD, Kristin Ow Chapman, MD, Mark I. Rosenblatt, MD, PhD, Priyanka Sood, MD, Ana G. Alzaga Fernandez, MD, Michelle N. Lee, OD, and Kimberly C. Sippel, MD

Department of Ophthalmology, Weill Cornell Medical College, New York–Presbyterian, New York, NY, USA

ABSTRACT

Purpose: To evaluate continuous wear of a fluid-ventilated, gas-permeable scleral PROSE device using a standardized protocol as treatment for refractory persistent corneal epithelial defects in patients with severe ocular surface disease.

Methods: Retrospective review of eight eyes of seven consecutive patients with persistent epithelial defects refractory to traditional therapies. The standardized treatment regimen consisted of: (1) 24-hour-a-day PROSE wear until re-epithelialization was achieved, (2) brief daily device removal, cleaning, disinfection, and reservoir fluid replacement, (3) addition of a benzalkonium chloride (BAK)-free fourth-generation fluoroquinolone antibiotic drop to the reservoir, and (4) transition to long-term, daytime PROSE wear upon re-epithelialization.

Results: All eight eyes exhibited resolution of the persistent epithelial defect. No eyes developed microbial keratitis. Four eyes exhibited recurrences; all recurrences promptly responded to reinstitution of continuous wear.

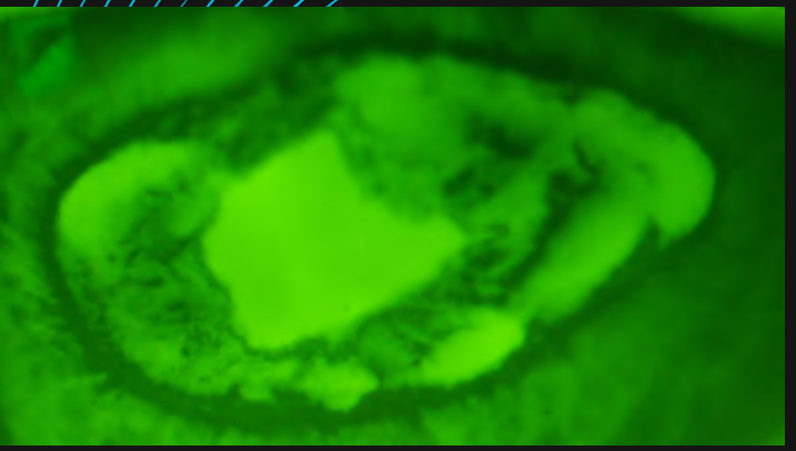
Conclusions: Continuous wear of a PROSE device, using a strictly standardized regimen, constitutes an effective, safe treatment option for refractory persistent epithelial defects.

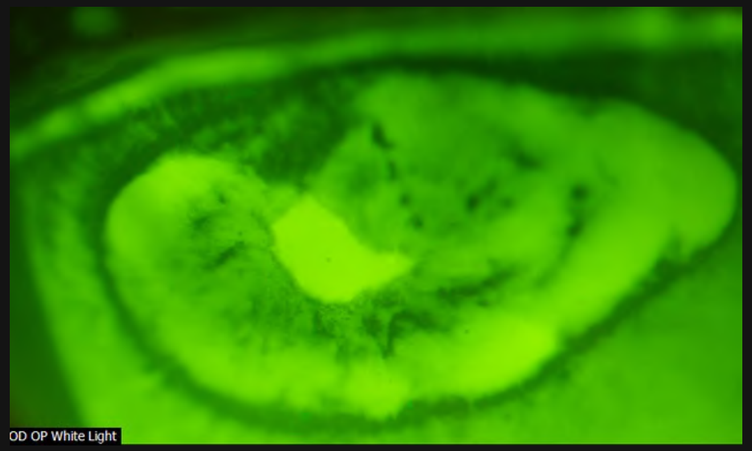
Keywords: Corneal disease, ocular surface disease, persistent epithelial defect, PROSE, scleral lens

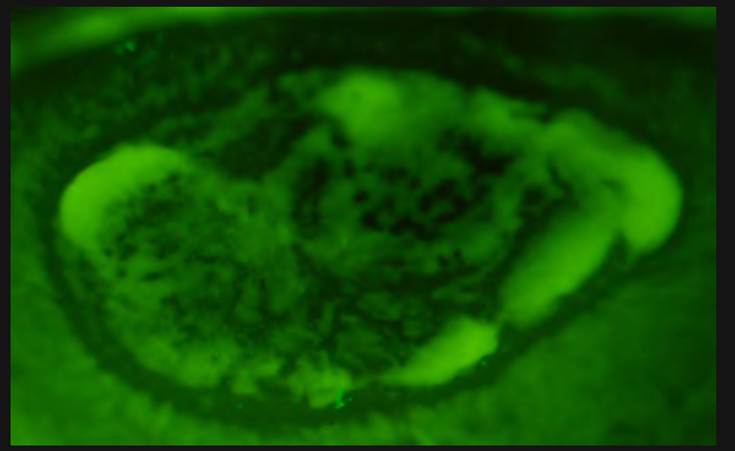
INTRODUCTION

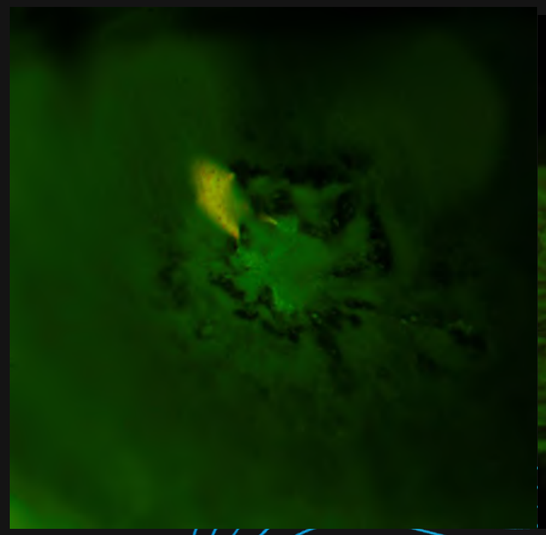
Prosthetic Replacement of the Ocular Surface Ecosystem (PROSE; BostonSight™, Needham, MA, USA) treatment uses a unique fluid-ventilated, gas-permeable scleral device that is custom-fit to a given patient's eye. The PROSE device (formerly known as the Boston scleral lens or BosP) was approved by the United States Food and Drug Administration (FDA) composed of artificial tears.[2] Additionally, the device provides a physical barrier, protecting the cornea and conjunctiva from eyelid blink-related microtrauma.[2,3] In general, PROSE is worn during the daytime (i.e. waking hours), with removal at bedtime; the device is reinserted the next morning with a fresh reservoir fluid.

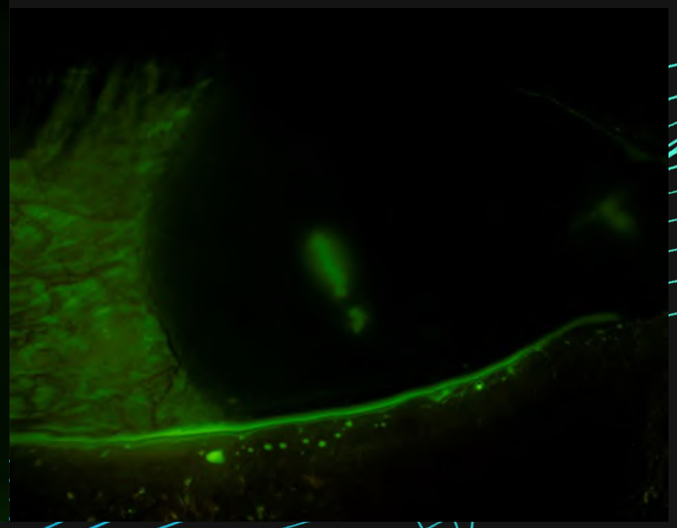
Patients with severe ocular surface disorders, marked by advanced keratoconjunctivitis sicca and/



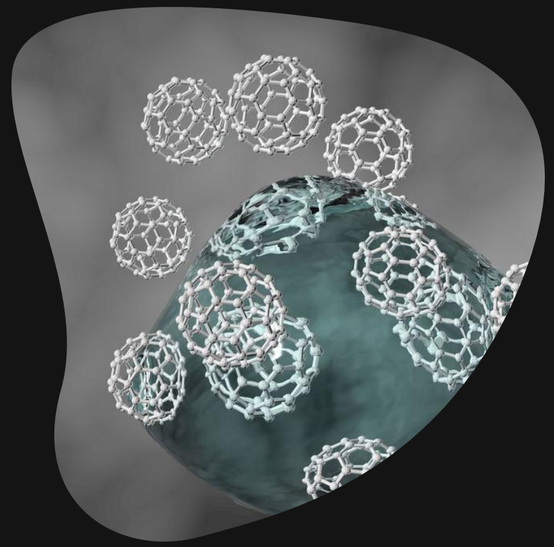

OD OP White Light







DRUG DELIVERY



Indirect Supporting Data

Treatment of Persistent Corneal Epithelial Defect With Overnight Wear of a Prosthetic Device for the Ocular Surface

PAULINE LIM, RYAN RIDGES, DEBORAH S. JACOBS, AND PERRY ROSENTHAL

• PURPOSE: To report experience in the treatment of persistent corneal epithelial defect using overnight wear of a prosthetic device for the ocular surface.
• DESIGN: Retrospective interventional case series.
• METHODS: A clinical database of patients who underwent prosthetic replacement of the ocular surface ecosystem (PROSE) treatment from March 2003 to August 2008 was searched to identify patients treated for persistent corneal epithelial defect. In early 2003, overnight wear of a PROSE device and addition of commercially available, nonpreserved, topical ophthalmic moxifloxacin to the saline in the device reservoir became standard practice at this center when treating persistent corneal epithelial defect. Medical records were abstracted to obtain underlying diagnoses, previous treatments, days to re-epithelialization, and complications for subsequent analysis.
• RESULTS: PROSE treatment incorporating overnight wear, with adjunctive use of moxifloxacin, was employed in 20 eyes of 19 patients for a total of 372 days. Re-epithelialization occurred in 17 of 20 eyes. Median duration of treatment incorporating overnight wear was 8.5 days (range = 2-76 days). Healing occurred in ≤7 days in 12 eyes, 8-14 days in 3 eyes, and >14 days in 2 eyes (range = 1-35 days). There were no cases of microbial keratitis.
• CONCLUSIONS: Overnight wear of a PROSE device is effective in promoting healing of persistent corneal epithelial defect. In comparison to an earlier series from this center, the rate of microbial keratitis as a complication of treatment has been reduced with the use of a nonpreserved topical fourth-generation fluoroquinolone in the device reservoir. (Am J Ophthalmol 2013;156:1095–1101. © 2013 by Elsevier Inc. All rights reserved.)

PERSISTENT CORNEAL EPITHELIAL DEFECT OCCURS when conditions such as exposure, limbal stem cell deficiency, dry eye syndrome, diabetes, or neurotrophic keratitis interfere with normal functions of the ocular surface. Persistent corneal epithelial defect can result in corneal haze, infectious and sterile keratitis, stromal melting, perforation, irregular astigmatism, loss of vision, and loss of the eye. Interventions for persistent corneal epithelial defect typically include topical lubricants, patching,[1,2] punctal occlusion, soft contact lenses,[3,4] tarsorrhaphy,[5] topical autologous serum,[6–10] and amniotic membrane grafting.[11]

Prosthetic replacement of the ocular surface ecosystem (PROSE) is a treatment that uses custom-designed and custom-fabricated prosthetic devices to replace or augment the impaired ocular surface functions in complex corneal disease. A PROSE device (Figure 1), because of its high oxygen permeability, fluid-filled reservoir, lack of corneal contact, positional stability on the eye, and protection from lid-related shear forces, creates an environment that supports healing and maintenance of the corneal surface. A 2000 report from this center (Boston Foundation for Sight, Needham, Massachusetts, USA)[12] described 4 cases of microbial keratitis among 14 cases of persistent corneal epithelial defect treated with extended wear of a PROSE device. This infection rate suggested that the benefits of off-label overnight wear may not outweigh the risks. With a combination of heightened awareness of potential preservative toxicity, a standardized medical approach using both daytime and overnight wear with daily monitoring and cleaning, and the prophylactic use of a commercially available, nonpreserved fourth- generation fluoroquinolone, we observed clinical effectiveness with an apparent reduction in infections. To better characterize our experience, we conducted a retrospective review of an interventional case series of all eyes that underwent PROSE treatment for persistent corneal epithelial defect at this center in the time period immediately following the introduction of a nonpreserved fourth-generation fluoroquinolone to our treatment regimen.

METHODS

WESTERN INSTITUTIONAL REVIEW BOARD (IRB) PROSPECtively determined that this retrospective medical record review of an interventional case series was exempt from IRB review under 45 CFR 46.101(b)(4). This study was

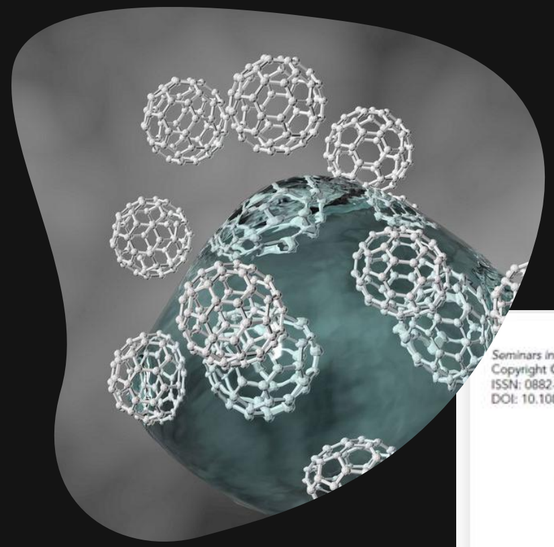
Accepted for publication Jun 4, 2013.
From Massachusetts Eye & Ear Infirmary, Boston, Massachusetts (P.L.); and Boston Foundation for Sight, Needham, Massachusetts (R.R., D.S.J., P.R.).
Pauline Lim is currently at Southern California Permanente Medical Group, La Palma, California.
Inquiries to Ryan Ridges, Boston Foundation for Sight, 464 Hillside Ave, Suite 205, Needham, MA 02494; e-mail: rridges@bostonsight.org

20 EYES OF 19 PTS

NO CASE OF MICROBIAL KERATITIS

DRUG DELIVERY

Direct Supporting Data



12 YEARS AGO

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DOI: 10.1080/08820530902802013

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The Boston Ocular Surface Prosthesis as a Novel Drug Delivery System for Bevacizumab

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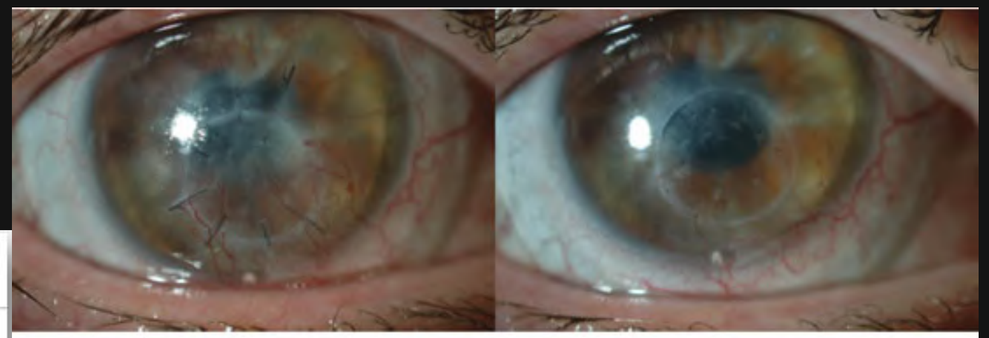
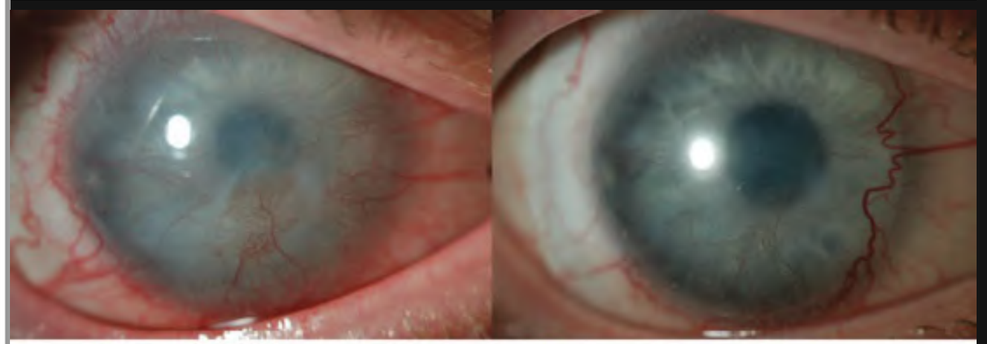
Deborah S. Jacobs, Perry Rosenthal, and Karen G. Carrasquillo
Boston Foundation for Sight, Boston, Massachusetts, USA

ABSTRACT

Corneal neovascularization causes deterioration of visual acuity and increases surface irregularities. Various techniques have been employed to help control the progression of corneal neovascularization; bevacizumab is a medication that targets the specific pathway of corneal neovascularization. The Boston Ocular Surface Prosthesis (BOSP) is a large diameter contact lens that aids in maintaining corneal surface integrity and may serve as a delivery system for topical bevacizumab. This paper reviews five patients who were treated with topical bevacizumab in their BOSP. All patients demonstrated improvement in their visual acuity and clinical exam. No adverse reactions were noted.



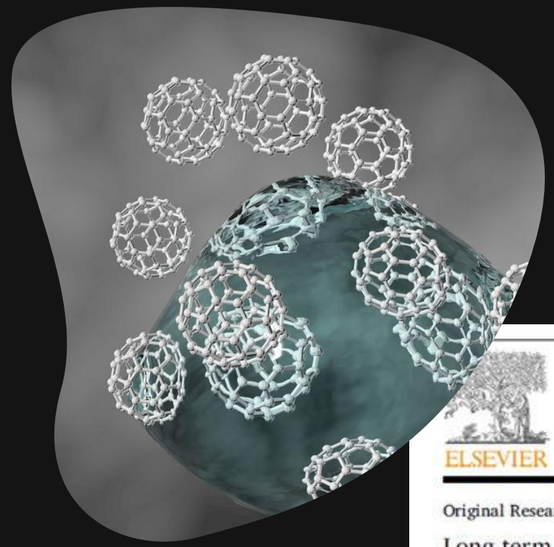
Patient 4: Prior to bevacizumab therapy (Count Fingers vision) and at 5 months (20/400).



Patient 3: Prior to bevacizumab therapy (20/400 vision) and at 4 months (20/60 vision).

DRUG DELIVERY

Direct Supporting Data



2018

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Original Research

Long-term outcome of using Prosthetic Replacement of Ocular Surface Ecosystem (PROSE) as a drug delivery system for bevacizumab in the treatment of corneal neovascularization

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ARTICLE INFO

Keywords:
Prosthetic replacement of ocular surface ecosystem (PROSE)
Scleral lens
Corneal neovascularization
Vascular endothelial growth factor (VEGF)
Bevacizumab
Ocular surface disease

ABSTRACT

Purpose: To report the long-term outcome of Prosthetic Replacement of the Ocular Surface Ecosystem (PROSE) for delivery of bevacizumab in the treatment of corneal neovascularization (KNV).

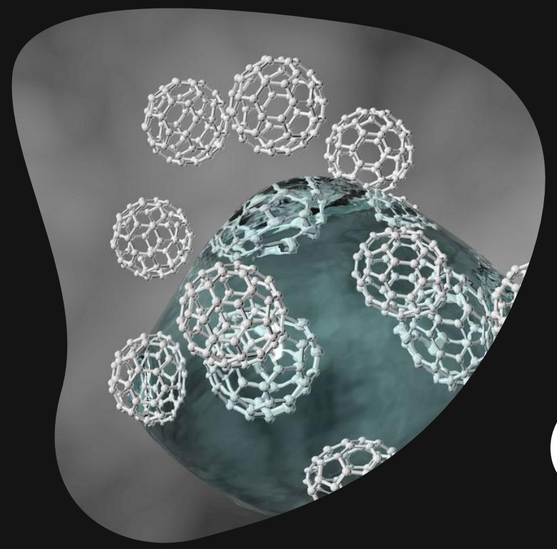
Methods: Retrospective, non-comparative, interventional case series of 13 sequential patients treated for KNV at the BostonSight between 2006 and 2017. In all cases, PROSE treatment was initiated for management of ocular surface disease and patients wore PROSE consistently on a daily wear basis prior to bevacizumab treatment. Patients applied a drop of 1% preservative free bevacizumab to the reservoir of PROSE device twice daily. Patients continued with daily wear of the device during treatment and afterwards.

Results: 13 patients (8 female and mean age of 45 years) are included with a mean follow-up of 5.1 years (range 6 months–11 years). Underlying ocular diagnoses included Stevens-Johnson syndrome (7), ocular chronic graft-versus-host disease (2), corneal transplant (2), contact lens-related corneal ulcer and limbal stem cell deficiency (1), and familial dysautonomia (1). Median duration of bevacizumab use was 6 months (range 3 months–10 years). Twelve cases (92%) had regression of KNV and 10 cases (77%) had improved best-corrected visual acuity (BCVA) with treatment. Median BCVA improved from −1.1 (LogMAR) at baseline, to −0.66 at end of bevacizumab treatment, and remained −0.63 at last follow-up (P = 0.047). KNV progressed in one eye after discontinuation of bevacizumab. There were no ophthalmic or systemic complications.

Conclusions: Topical bevacizumab used in PROSE is effective in treating KNV and improving vision. Long-term follow-up reveals durable response and no complications.

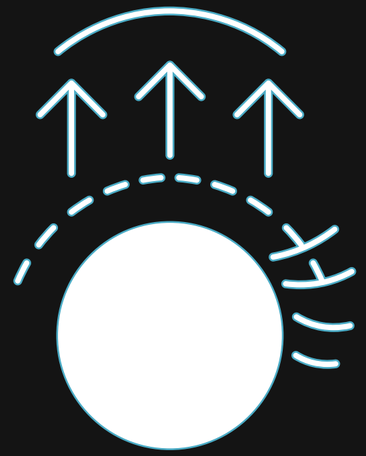
- 13 PTS
- 12 HAD KNV REGRESSION
- 10 HAD INCREASED BCVA
- NO CASES OF MK REPORTED

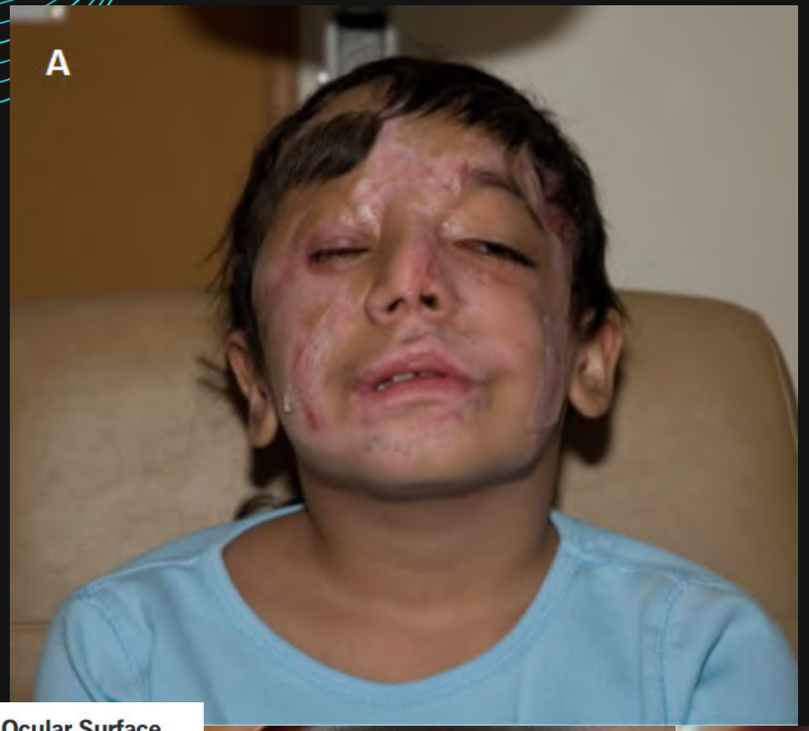
DRUG DELIVERY

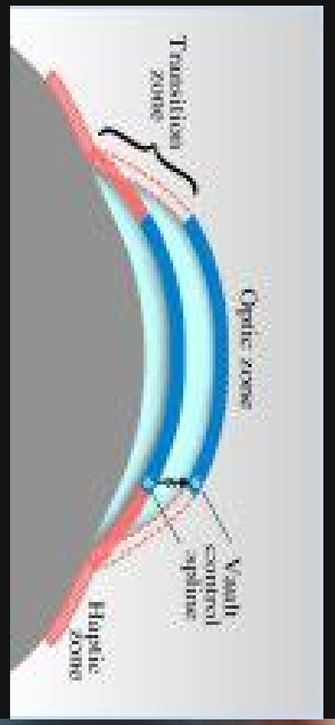


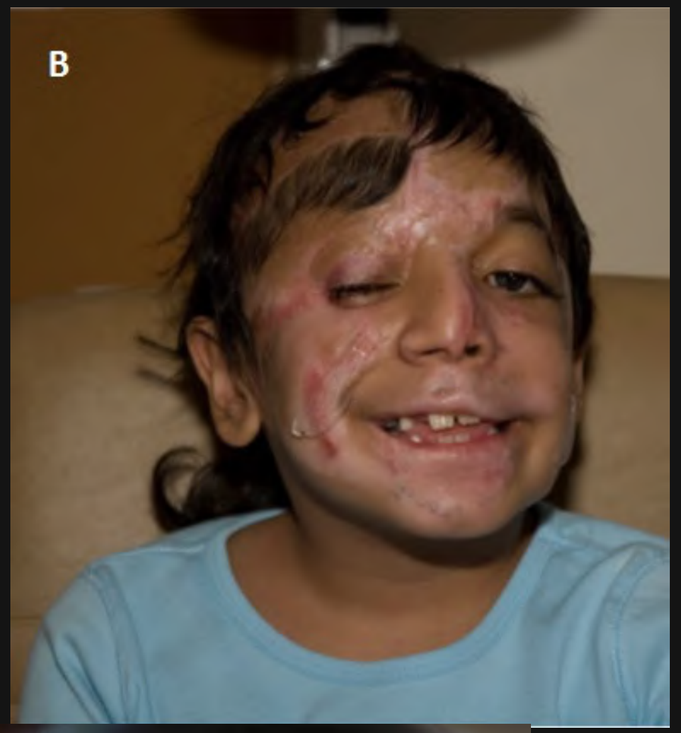
Growing area of research

LID CRUTCH









Case Report: Use of Prosthetic Replacement of the Ocular Surface Ecosystem Treatment of Traumatic Lid Ptosis in a Pediatric Patient

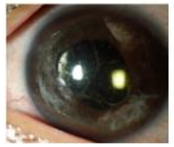
Kendra Phillis, OD,[1] Daniel Brocks, MD,[1,2] and Karen G. Carrasquillo, OD, PhD, FAAO[1,2]*

SIGNIFICANCE: This report shares the long-term outcomes of an uncommon use of prosthetic replacement of the ocular surface ecosystem (PROSE) treatment and scleral lenses in the treatment for patients with ptosis who are not surgical candidates.

PURPOSE: This study aimed to describe a case of pediatric traumatic lid ptosis and follow-up during an 8-year period with PROSE treatment.

CASE REPORT: A 7-year-old Honduran girl presented with a history of severe cranial, facial, and ocular trauma as a result of a motor vehicle accident. Significant ptosis with left-sided facial paralysis and irregular astigmatism significantly reduced the patient's visual function in the left eye. She was evaluated and treated with a scleral prosthetic device in the left eye to improve vision, the ocular surface, and overall function for activities of daily living. After 8 years of PROSE treatment, acuity in the left eye remained stable at 20/25. The corneal health remained stable throughout this period, without complications of corneal neovascularization or corneal edema.

CONCLUSIONS: Prosthetic replacement of the ocular surface ecosystem treatment provided support of the ocular surface and mechanical left upper eyelid lift in a traumatic eyelid ptosis, ultimately providing improved visual function during an extensive 8-year period in a pediatric patient. Further studies are needed to evaluate the applicability of this approach in broader ptosis cases.



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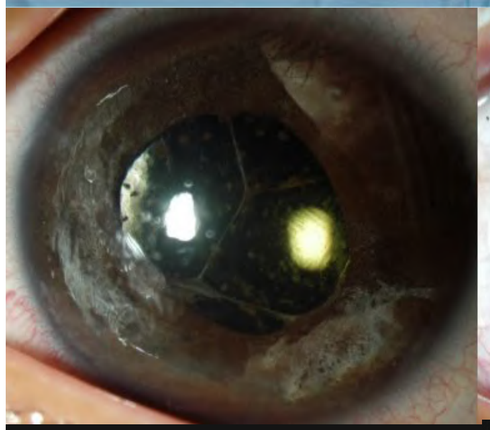
Optom Vis Sci 2020;97:1029–1033. doi:10.1097/OPX.0000000000001612

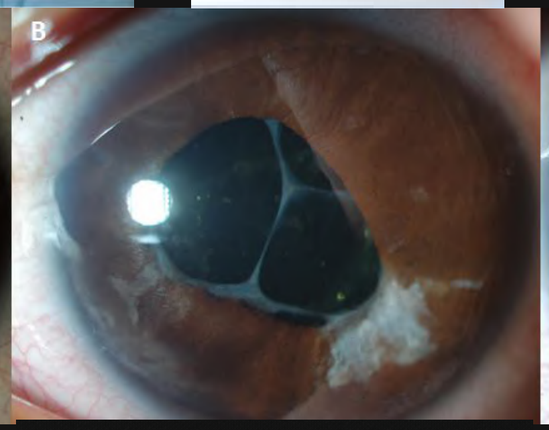
Eyelid ptosis is a condition in which the upper eyelid is positioned abnormally low. Depending on severity, a ptosis may lead to vision loss due to occlusion of the visual axis. There are many etiologies for eyelid ptosis, including congenital or acquired cases of neurogenic, myogenic, mechanical, aponeurotic, and traumatic origin. Furthermore, the severity of unilateral ptosis may be described as minimal (1 to 2 mm), moderate (3 to 4 mm), or severe (>4 mm) based on the amount of difference in palpebral fissure between the two eyes.[1,2]

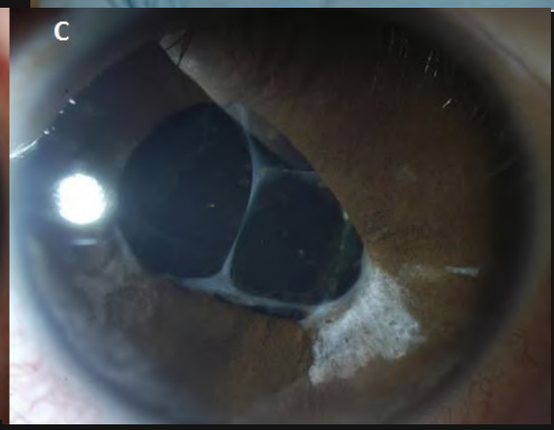
The levator palpebrae superioris and Muller's muscle are the two muscles responsible for elevating the upper eyelid. The primary

A scleral lens can be modified to increase the sagittal depth to lift the upper eyelid and minimize the degree of eyelid ptosis.[6] Scleral lenses have previously been used to improve ptosis through the addition of a scleral shelf or ptosis prop. In those methods, the scleral lens material is thicker and notched on the front surface to support the upper eyelid. There have been other reports using "pegs" in the front surface and also using the sagittal height of the lens to hold the lid.[7–9]

In this case report, prosthetic replacement of the ocular surface ecosystem treatment was used to manage a case of traumatic eyelid ptosis during an 80-year period to date.

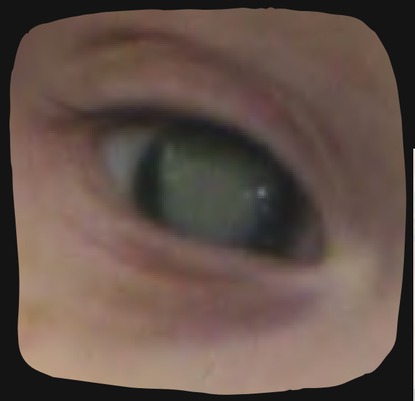


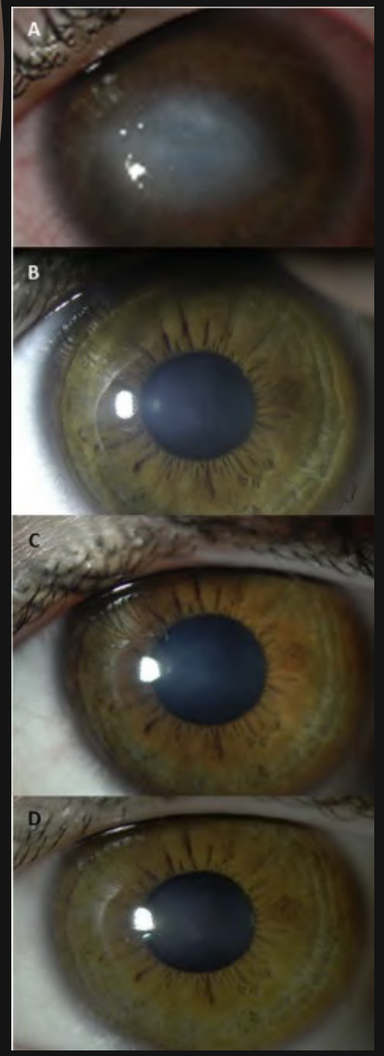




9 YEARS

Clearing of opacities





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American Journal of Ophthalmology Case Reports

journal homepage: www.elsevier.com/locate/ajoc

Case report

Improvement of chronic corneal opacity in ocular surface disease with prosthetic replacement of the ocular surface ecosystem (PROSE) treatment

Anna Cressey[a,1], Deborah S. Jacobs[a,b], Crystal Remington[a,c], Karen G. Carrasquillo[a,c,*]

[a] BostonSight, 464 Hillside Ave, Suite 205, Needham, MA, 02494, United States
[b] Massachusetts Eye and Ear, 243 Charles St., Boston, MA, 02114, United States
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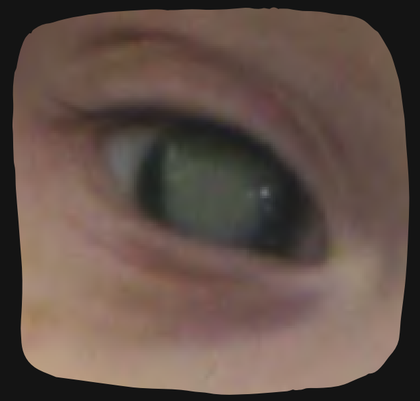
ARTICLE INFO

Keywords:
PROSE treatment
Ocular surface disease
Opacity
Corneal scar
Dry eye syndrome
Scleral lenses
Scleral prosthetic devices

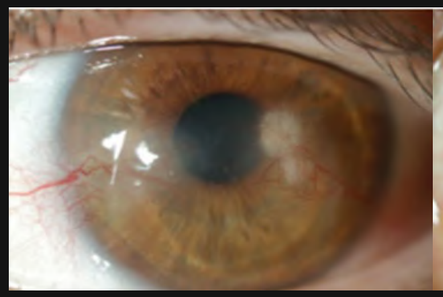
ABSTRACT

Purpose: To demonstrate clearing of chronic corneal opacities and improvement of visual acuity with the use of BostonSight prosthetic replacement of the ocular surface ecosystem (PROSE) treatment in ocular surface disease.
Observations: We undertook retrospective analysis of the medical records of a series of patients who underwent PROSE treatment from August 2006 to December 2014. Patients were referred for ocular surface disease of various etiologies. Primary inclusion criterion was corneal opacity that improved with PROSE treatment. Patients were excluded if topical steroids or adjuvant therapy used once PROSE treatment was initiated. Underlying disease, prior treatment, clinical presentation, and clinical course were extracted from the medical record. Four patients are included in this series. There were three females and one male; median age at time of treatment initiation was 30 years (range = 0.5–58 years). Median duration of PROSE treatment at time of retrospective analysis was 3.5 years (range = 1–8 years). Two cases had corneal opacification in the context of neurotrophic keratopathy: a unilateral case due to presumed herpes simplex keratitis and a bilateral case due to congenital corneal anesthesia associated with familial dysautonomia. One case had corneal opacity from exposure related to seventh nerve palsy, and one had corneal opacification associated with recurrent surface breakdown, neurotrophic keratopathy, and limbal stem deficiency of uncertain etiology. After consistent wear of prosthetic devices used in PROSE treatment for support of the ocular surface, visual acuity improved and clearing of the opacities was observed, without use of topical steroids or adjuvant therapy.

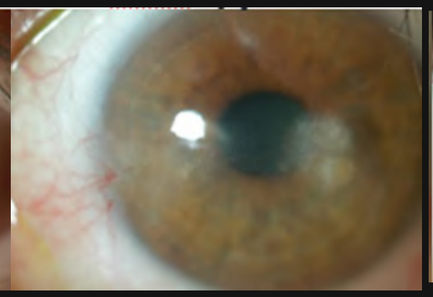


Clearing of opacities - irregular cornea

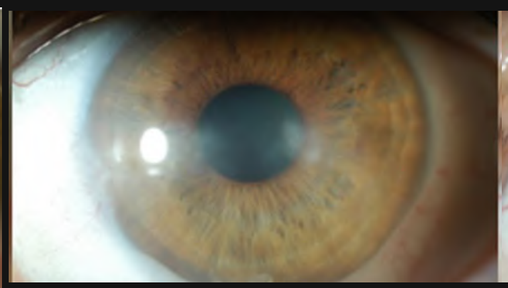
BASELINE 20/30



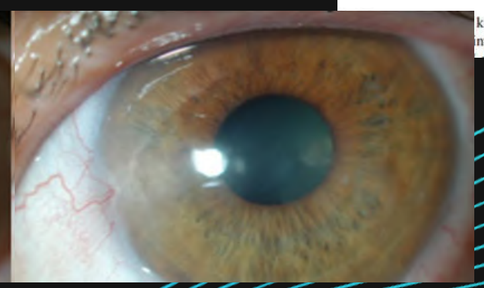
6 MOS S/P



2 YRS S/P



4 YRS S/P



Management of Vascularized Limbal Keratitis With Prosthetic Replacement of the Ocular Surface System

Anna Sleeper, O.D., Deborah S. Jacobs, M.D., and Karen G. Carrasquillo, O.D. Ph.D

Purpose: To describe a case of contact lens–induced vascularized limbal keratitis (VLK) and management with prosthetic replacement of the ocular surface system (PROSE) treatment.

Methods: Clinical retrospective case report describing the clinical appearance, course of development, and treatment of VLK with PROSE.

Results: A 58-year-old white woman presented with a history of advanced keratoconus and almost four decades of contact lens wear, including polymethyl-methacrylate, small-diameter, gas-permeable lenses, low-Dk hybrid, and piggyback lens modalities. Complications of lens wear caused the development of extensive VLK in both eyes, with vascularization, lipid keratopathy, and corneal scarring projecting into the central cornea, more so in the left eye. She was evaluated and treated with PROSE in both eyes, demonstrating initial improvements in both comfort and vision, from 20/30 to 20/25 in the right eye and from 20/40 to 20/20 in the left eye. After 2 years of PROSE treatment, she reported excellent vision and comfort. Acuities were OD $20/25^{+2}$ and OS $20/20^{-/+}$. There was normalization of the corneal surface with reduced staining and epithelial irregularity, and there was substantial regression of corneal neovascularization and opacity, particularly in the left eye.

Conclusions: PROSE, by normalizing the environment at the ocular surface, ultimately improved visual function and long-term ocular health for this patient.

Key Words: Prosthetic replacement of the ocular surface ecosystem—PROSE—Vascularized limbal keratitis—Neovascularization—Keratoconus—Surface ocular disease—Corneal scar.

(*Eye & Contact Lens* 2011;0: 000–000)

keratitis (VLK) is an inflammatory rigid lens involves the conjunctiva, limbus, and cornea.

the past 30 years has reduced general awareness of this entity, particularly among ophthalmologists and cornea specialists.

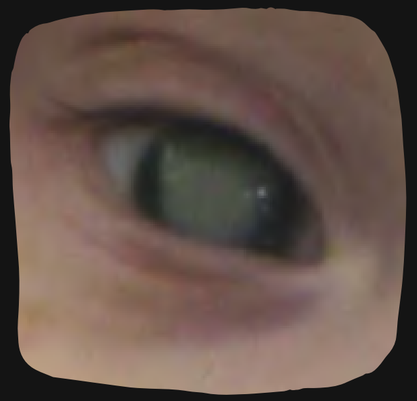
Clinically, VLK presents as an elevated, semiopaque, epithelial lesion with adjacent epithelial staining and neovascularization. The neovascularization arises at the limbus and advances radially to a locus of nodular epitheliopathy.[1,2] This process typically occurs at 3 and 9 o'clock, or just inferiorly to those zones at 4 and 8 o'clock, in the sectors of corneal exposure and dessication. Vascularized limbal keratitis typically occurs in patients with a history of either daily or extended wear of polymethyl-methacrylate (PMMA), silicone/acrylate, and fluorosilicone/acrylate materials. Vascularized limbal keratitis is typically associated with large diameter or steep lens designs, which by mechanical factors are predisposed to local desiccation, impingement, and microtrauma from compression of the lens edge into the corneal epithelium.

Patients with VLK present with complaints of increased lens awareness, reduced wearing time, and ocular pain. Most report moderate irritation and an enlarging sector(s) of redness. There can be varying levels of photophobia, tearing, and dry eye symptoms.[1] Although discontinuation or refitting of lenses can allow regression of signs and symptoms, continued oxidative stress and trauma can cause further progression of the inflammatory and vascular response.[1,2]

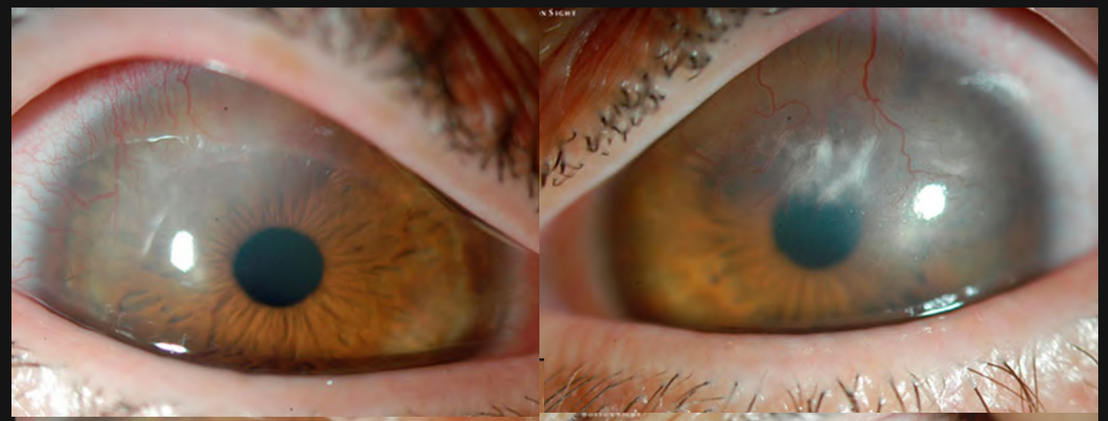
Prosthetic replacement of the ocular surface ecosystem (PROSE) is a treatment developed by the Boston Foundation for Sight, Needham, MA, to restore vision, support healing, reduce symptoms, and improve quality of life for patients experiencing complex corneal diseases, including irregular astigmatism and ocular surface disease.

PROSE uses Food and Drug Administration–approved custom

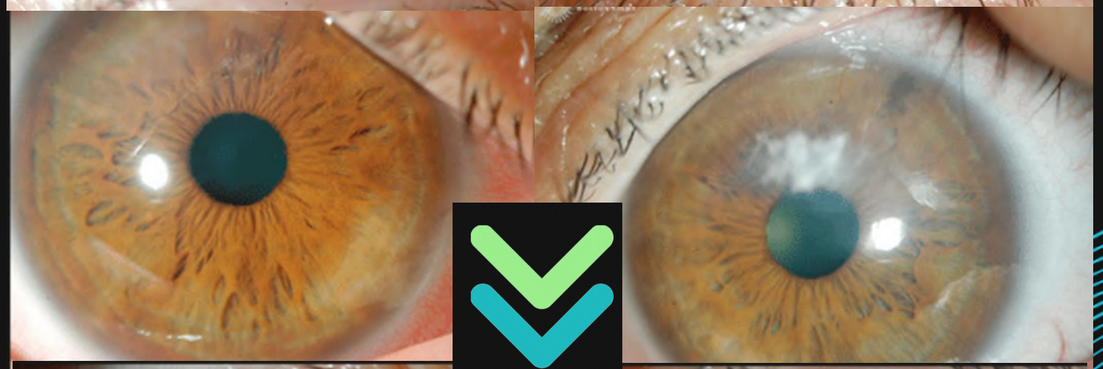
Clearing of opacities - Irregular Cornea



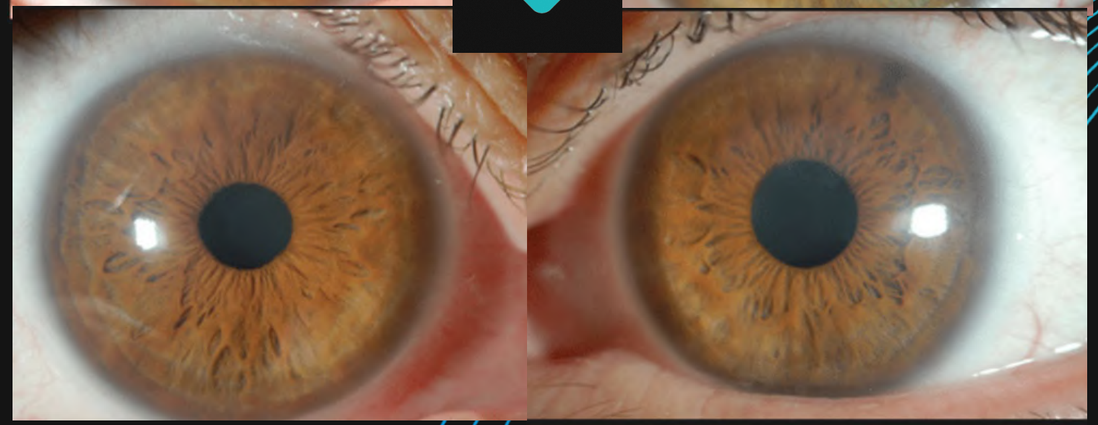
BASELINE



2 MOS S/ P



2 YRS S/ P



Case Report

What Makes a Scleral Lens Fit Physiological? A Case Report

Alan Kwok[1,2] and Karen G Carrasquillo[1,2]*

[1]BostonSight, Needham, MA, USA

[2]New England College of Optometry, Boston, MA, USA

tion for these corneas that had previously been compromised with active deleterious processes. Despite resulting central clearance being around 400-500 µm, not only were there no adverse effects observed at the cornea/ocular surface, but rather a significant regression in haze and neovascularization was noted over the years. This case highlights that what makes a scleral lens fit physiological is likely more than just the amount of apical clearance or exact amount of post-lens tear layer thickness, but most likely a combination of many factors including lens diameter, limbal clearance, lack of suction, peripheral haptic alignment and tear exchange under the lens.

Introduction

Scleral lens usage has surged in popularity among contact lens fitters in recent years as an option for many ocular conditions [1]. There may be several reasons for this, not the least of which is the potentially profound improvement in vision in irregular corneas [2] and the management of severe ocular surface disease with the use of scleral lenses [3,4]. With all the potential benefits, as with all other treatments, the risk/benefit ratio must be assessed to determine if the benefits a scleral lens confers outweighs the potential risks introduced. One approach is to determine if the lens is physiologically viable and that no harm is introduced to the ocular environment while it is being worn. Assessment of the ocular surface, which includes the cornea and conjunctiva, before and after using scleral lenses are crucial to determining viability. Current practice commonly involves the scrutiny of lens central clearance or post-lens tear layer thickness, based upon several theoretical studies that correlate lens central clearance to oxygen tension levels and the potential effect this may have on corneal physiology.

PROSE (prosthetic replacement of the ocular surface ecosystem) is a treatment developed by BostonSight to restore vision, support healing, reduce symptoms and improve quality of life for patients experiencing complex corneal disease, including irregular corneas and ocular surface disease. PROSE uses Food and Drug Administration- approved custom designed and fabricated prosthetic devices to replace and or support impaired ocular surface system functions that protect and enable vision.

The fluid-ventilated gas-permeable (GP) prosthetic devices clear the cornea and immerse the entire ocular surface in a reservoir of preservative free saline solution while the haptics of the device rests entirely on the conjunctiva. Fitting is done diagnostically using a lens trial set. Modifications to subsequent trials are made after evaluating the fit of the initial trial device.

This report presents the case of a patient with active ocular surface processes which resolved with the use of PROSE devices.

Case Report

Patient AS is a 51 year old Caucasian male who was referred to our clinic in April 2015 by his ophthalmologist for PROSE treatment consultation. He had a history of keratoconus in both eyes and hybrid

Abstract

Purpose: To describe a case demonstrating the resolution of active corneal neovascularization, haze and overall adequate physiological function with the fitting of a prosthetic replacement of the ocular surface ecosystem (PROSE) device.

Methods: Clinical retrospective case report describing the clinical appearance in compromised keratoconus eyes before and after treatment with PROSE devices. A 51 year old Caucasian male with keratoconus was fitted into PROSE devices after decades of wearing hybrid and rigid gas permeable contact lenses. Observations noted at the entering exam included active corneal neovascularization with associated haze in both eyes that accompanied symptoms consistent with contact lens intolerance: pain, itchiness, dryness and photophobia with lens wear. He was fitted with customized PROSE devices in both eyes to improve fit, comfort and protect the ocular surface. Adequate fitting endpoints were determined to be haptic alignment in all quadrants, adequate surface area over the haptics to adequately distribute the weight of the vaulting scleral lens adequately (usually this results in the use of a large diameter lens), ruling out suction under the scleral lens and no corneal or limbal touch. No special attention was paid to exactly how much clearance there was centrally - in this case the resulting central clearance was around 400-500 µm.

Results: Evaluation over the course of 2 years shows regression of corneal neovascularization and resolution of corneal haze along with improved comfort and resolution of dryness, irritation and photophobic symptoms.

Conclusion: PROSE devices were a successful therapeutic op-

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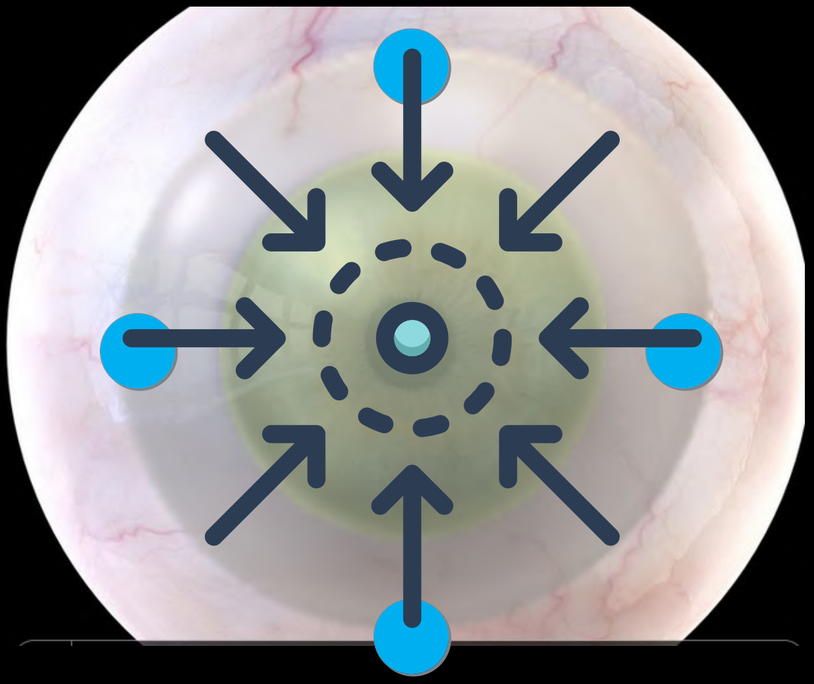
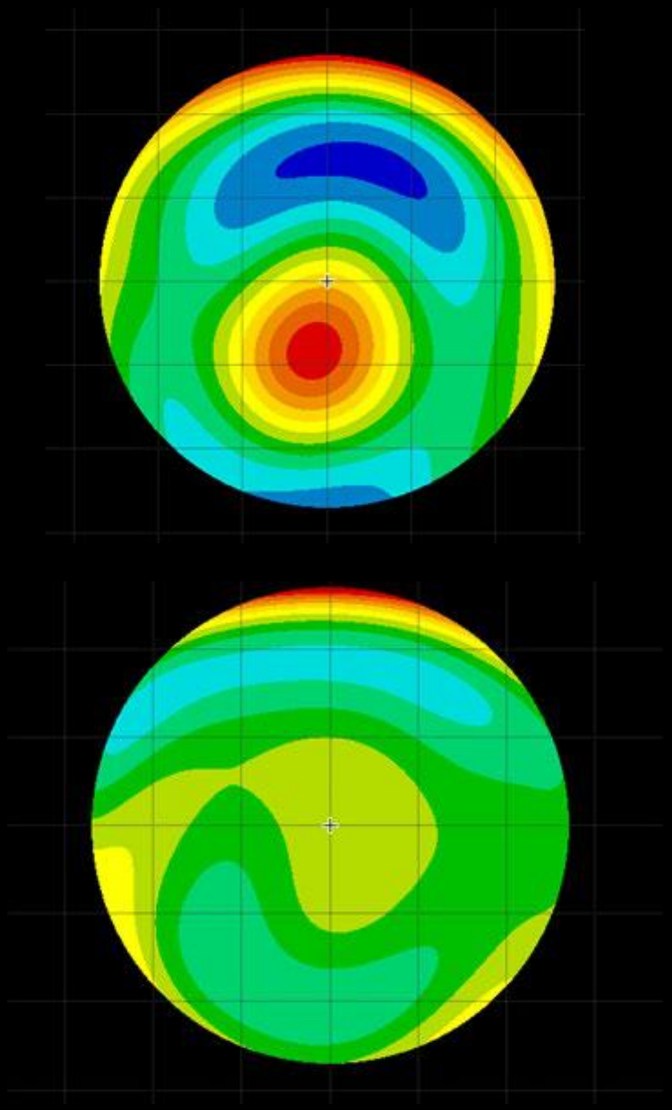
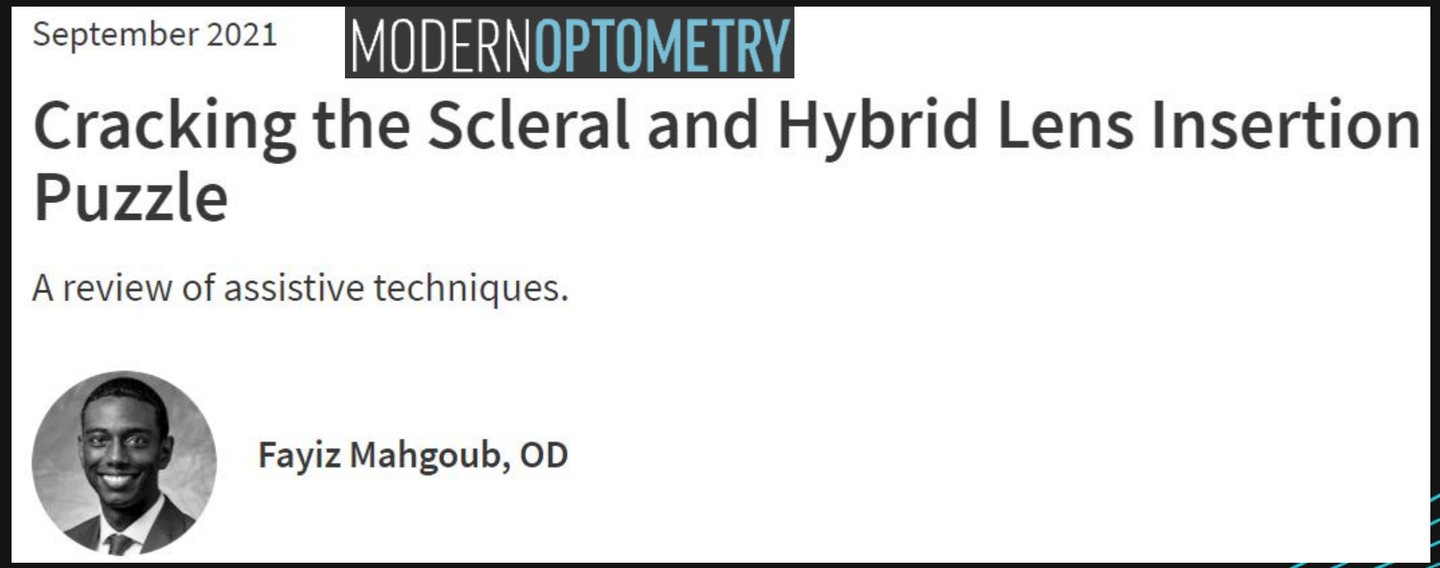
HIGHER ORDER ABERRATIONS





Scleral Lens Application Techniques

Scleral Lens Application Techniques



Scleral Lens Application Techniques

September 2021 MODERNOPTOMETRY

Cracking the Scleral and Hybrid Lens Insertion Puzzle

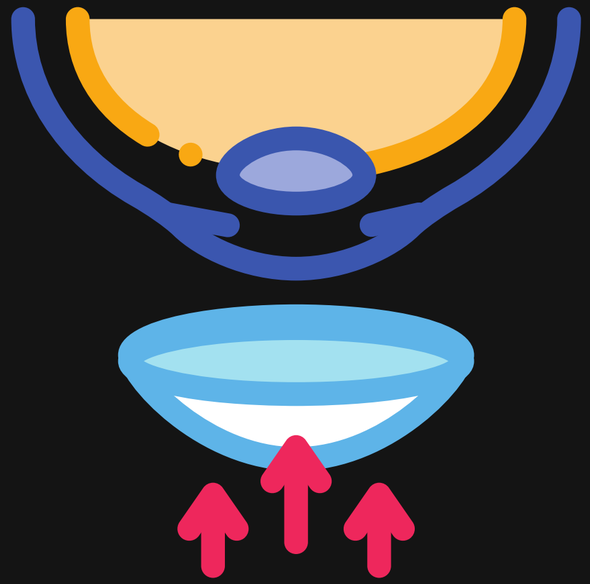
A review of assistive techniques.

Fayiz Mahgoub, OD

TABLE. Levels of Lens Insertion Techniques: Pros and Cons

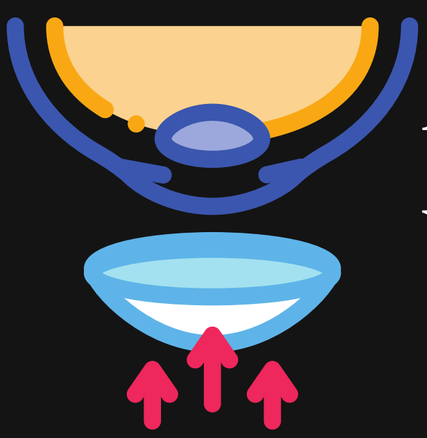
	PROS	CONS
Level 1	The patient does not need to purchase, clean, or store any assistive devices.	Requires the most dexterity and can take the longest to master. Patients may find it difficult to hold their lids open while simultaneously balancing the lens.
Level 2	The tools used are readily available and relatively inexpensive.	Requires a fair amount of dexterity. Patients may find it difficult to hold their lids open while simultaneously balancing the lens.
Level 3	Allows better eyelid control than the lower-level techniques. The lens stabilization and light target provided by lens stands helps reduce spillage of lens insertion solution, which reduces the occurrence of air bubbles. Allows insertion in fewer attempts, saving time and conserving saline solution, which can be costly.	Purchasing the tools used in this technique creates an additional expense to the patient.
Level 4	Surgical tape is readily available and relatively inexpensive.	Peeling the tape off the eyelids after insertion may be irritating to sensitive eyelids.

Application without assistive devices



Scleral Lens Education Society
https://sclerallens.org/wp-content/uploads/2020/05/SLS-PATIENT-INFO-HANDOUT_02-11-2020-1.pdf

Level 1	The patient does not need to purchase, clean, or store any assistive devices.	Requires the most dexterity and can take the longest to master. Patients may find it difficult to hold their lids open while simultaneously balancing the lens.

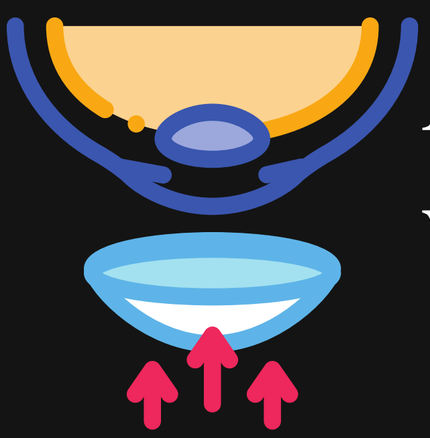


Application with assistive devices

DMV Scleral Cup
DMV Vented Scleral Cup
DMV Luma-Serter Plus
EZi Lens Applicator ring
Chio
Size 8 O-ring

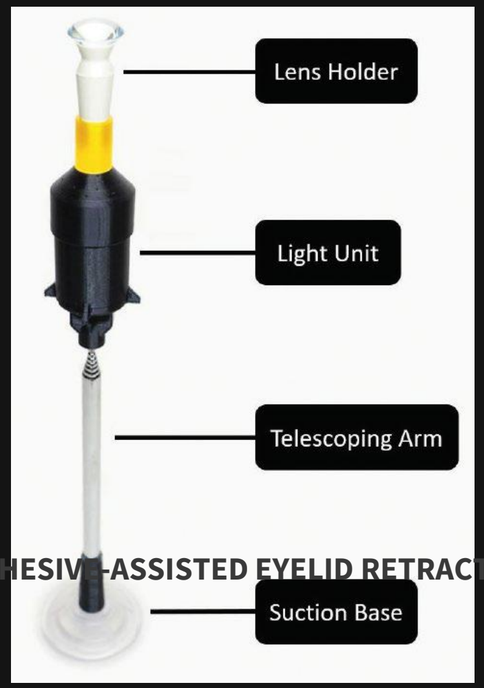



Level 2	The tools used are readily available and relatively inexpensive.	Requires a fair amount of dexterity. Patients may find it difficult to hold their lids open while simultaneously balancing the lens.

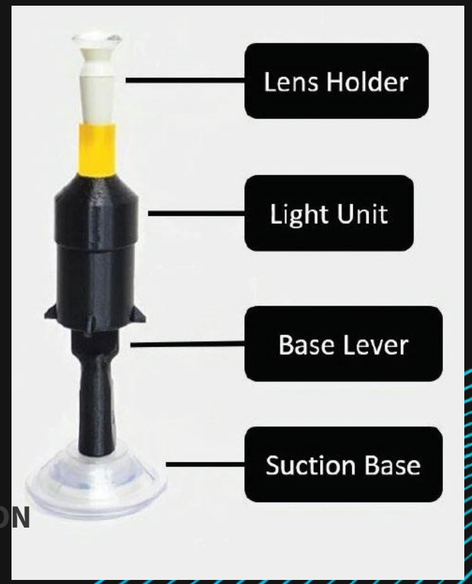


Application with stands

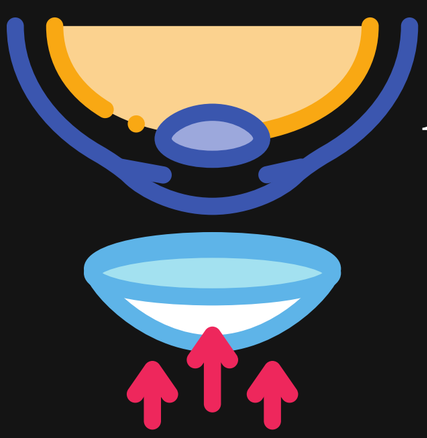
The See-Green System Light & Stand
The S5 Inserter
The S5 Mini Inserter



ADHESIVE-ASSISTED EYELID RETRACTION



Level 3	Allows better eyelid control than the lower-level techniques. The lens stabilization and light target provided by lens stands helps reduce spillage of lens insertion solution, which reduces the occurrence of air bubbles. Allows insertion in fewer attempts, saving time and conserving saline solution, which can be costly.	Purchasing the tools used in this technique creates an additional expense to the patient.



Adhesive-assisted lid retraction

Mahgoub Protocol
3M Transpore Surgical Tape (3M)

Step No. 2: Dampen a piece of tissue with water or saline and use it to wipe the upper and lower eyelids to remove excess skin oils.
Step No. 3: Peel off a strip of surgical tape about 3 inches in length and fold it onto itself to create a tab.
Step No. 4: Unroll an additional 1/8th inch section of tape and cut it with a pair of scissors. (Although surgical tape is easy to tear by hand, doing so transfers the natural oils found on our fingers to the tape, making it less sticky. For this reason, it is important to use scissors to cut the tape.)
Step No. 5: Adhere the exposed section of tape to the eyelid. The tape should be placed as closely as possible to the eyelashes without touching them.

Level 4	Surgical tape is readily available and relatively inexpensive.	Peeling the tape off the eyelids after insertion may be irritating to sensitive eyelids.

:grafts, PEDs, general first fit, pediatric patients, OCP, SJS, OSD in general

How to schedule scleral lens follow ups

Warranty/ Fitting Periods

KNOW/ LEARN YOUR DESIGN

Review Fitting Guides, watch webinars, talk to consultants

PAY ATTENTION TO WARRANTY PERIODS

Schedule accordingly.

SCHEDULE APPROPRIATELY DURING FITTING PERIOD

Avoid running past warranty periods if possible

CLOSE F/ U AFTER FIRST INITIAL FIT

1 month, 3 month, 6 month, 1 yr. Consider q6month or yearly thereafter

FOLLOW UP SCHEDULING PEARLS

GRAFTS

Every 6 months/Yearly
Fragile ones - Q6 mos

GVHD/SJS

Active Disease - Every 3-6 months

PERSISTENT EPITHELIAL DEFECTS

Every day until they heal

PEDIATRIC PATIENTS

Every 3-6 months

NK

Every 6 months

Why and When to co-manage

CORNEA

Grafts, CXL, HSV, Melts, Ruptures, Tarso, SJS (Worsening of neo, Pannus, PEDs)

GLAUCOMA

FILTERING PROCEDURES/ Tube erosion

BMT

cGVHD

PEDIATRICS

BV, Strabismus, Genetic Dz (FD, Mobieus, Goldenhars, etc)

OCULOPLASTICS

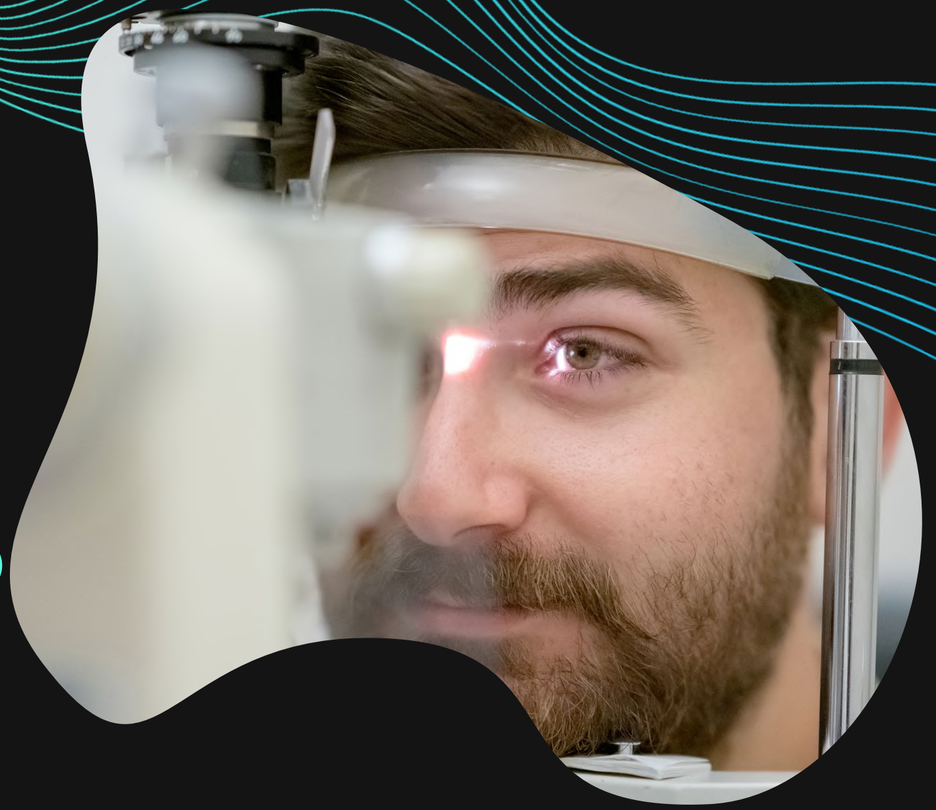
Lid rotation, MMG, electrolysis/ Exposure

NEUROLOGIST (PAIN)

Neuropathic Pain, Fybromyalgia

RHEUMATOLOGY

Sjogren's, Lupus



Educational Resources

kcarrasquillo@bostonsight.org

Thank you! Please join us for our next COPE event

Date: October 26, 2021
Time: 5:30 PM PST
Speaker: Dr. Paul Karpecki
Topic: Ocular Health, Nutrition, and Wine
COPE: Two hour live CE

Visit WooU.org for a full list of upcoming CE events!

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