

Photo courtesy of Melissa Barnett, OD, FAAO, FSLS, FBCLA

TREATING OCULAR SURFACE DISEASE WITH SCLERAL LENSES



These lenses can benefit patients with dry eye and other ocular surface diseases for whom alternative treatment options have been ineffective.

BY MELISSA BARNETT, OD, FAAO, FSLS, FBCLA

The popularity of scleral lenses is colossal among specialty contact lens practices, and it continues to grow in general optometric practices. Rigid contact lens prescriptions comprise 10% of all contact lens fits based on data obtained from mail or electronic survey forms from 20,000 fits across 30 markets.¹

The functions of scleral lenses can be broken into three major categories: restoration and support of the ocular surface, visual rehabilitation and correction of corneal irregularity, and pain attenuation. Preservative-free saline is deposited

in the bowl of the lens to continuously bathe, protect, and restore the ocular surface via the postlens tear reservoir. Scleral lenses have large diameters. They vault the cornea and limbus and gently land on the scleral conjunctiva.

SCLERAL LENSES AND DRY EYE DISEASE

Symptoms of dry eye disease (DED) include ocular dryness, grittiness, foreign body sensation, debilitating pain, photophobia, visual fluctuation, and visual distortion. Multiple studies have demonstrated that DED can

negatively affect a patient's quality of life. Although DED is increasingly prevalent, the condition is never diagnosed or treated in many patients, translating into a massive untapped market.

Where should scleral lenses fit into the DED treatment protocol?

MILD TO MODERATE DED

Scleral lenses should not be the primary therapy for patients who have mild to moderate DED without systemic comorbidities. Conventional treatment options should be tried first, including environmental modifications, preservative-free eyedrops, prescription DED medications, eyelid hygiene, nighttime lubrication or goggles, and punctal occlusion. When conventional treatments are insufficient, scleral lenses are a viable management option for patients with dry eye. In addition, scleral lenses have been indicated for the treatment of conditions that are associated with neuropathic ocular pain.²

MODERATE TO SEVERE DED

According to the Tear Film & Ocular Surface Society (TFOS) Dry Eye Workshop II (DEWS II), there is "increasing appreciation that daily wear of a rigid gas permeable scleral lens may play an important role in the management of moderate to severe DED."³ The TFOS DEWS II report positions scleral lenses as a tertiary therapy, after prescription medications and overnight treatments such as ointment or moisture goggles and before the long-term use of steroids, amniotic membrane grafts, surgical punctal occlusion, or other surgical procedures such as tarsorrhaphy or salivary gland transplantation.³ Additional step-three therapies include oral secretagogues, autologous/allogenic serum eye drops, and soft bandage contact lenses.

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INDICATIONS FOR OCULAR SURFACE DISEASE

Therapeutic scleral lens indications for ocular surface disease (OSD) include DED syndrome, exposure keratitis, neurotrophic keratitis, graft- versus-host disease, Stevens-Johnson syndrome, ocular cicatricial pemphigoid, chemical burns, limbal stem cell deficiency, Sjögren syndrome, and other systemic autoimmune diseases and persistent epithelial defects.

SCLERAL LENSES FOR EYES WITH NORMALLY SHAPED CORNEAS

Scleral lenses can be used for corneas that have a regular, normal, prolate shape and no disease, ectasia, or irregularities. There may

be coexisting conditions such as OSD, including DED.

Scleral lenses may be an option if a patient is experiencing reduced vision or comfort with conventional contact lenses. According to TFOS, the reasons for contact lens dropout are multifactorial.⁴ Discomfort that eventually leads to contact lens dropout may be due to the contact lens, environmental factors, or both.

Numerous publications have established that the rate of contact lens dropout ranges from 15% to more than 20%.⁵⁻⁸ If vision, comfort, or both are not optimal with the patient's current contact lens modality, scleral lenses are an option. Patients with DED and refractive errors such as myopia, regular

AT A GLANCE

- ▶ Scleral lenses should be considered after ocular lubricants and prescription eyedrops and before long-term topical corticosteroids and surgical treatments for DED.
- ▶ Patients with healthy corneas who may benefit from scleral lenses include those who have astigmatism who experience fluctuating vision with soft toric lenses, presbyopic patients with DED who wish to continue contact lens wear, and contact lens wearers who experience ocular dryness with their existing lenses.
- ▶ Three major categories of use for scleral lenses are: restoration and support of the ocular surface, visual rehabilitation and correction of corneal irregularity, and pain attenuation.

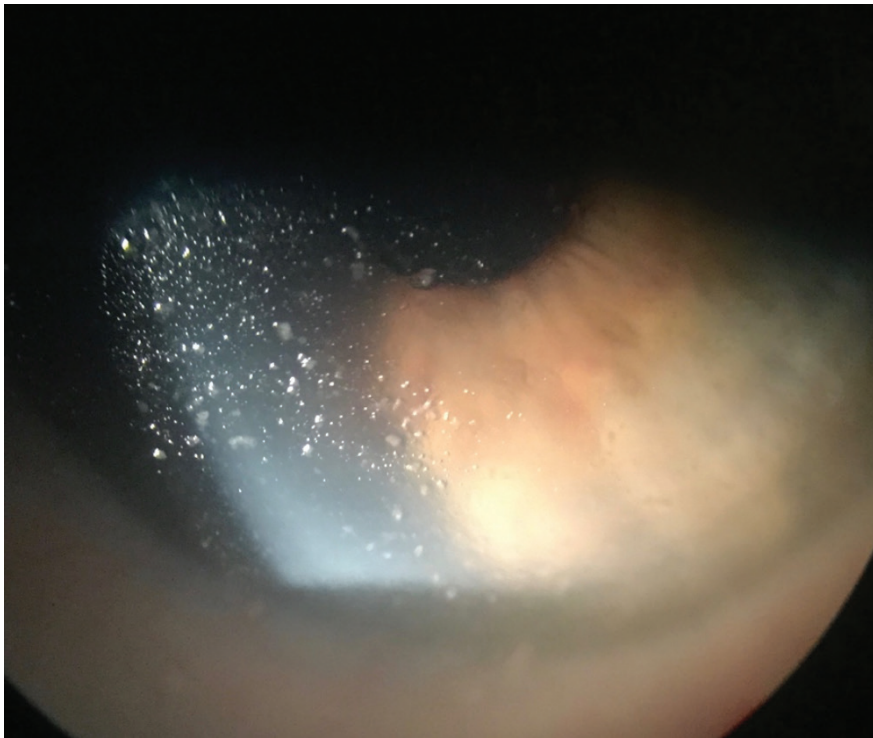


Figure. Significant anterior surface debris on a scleral lens.

astigmatism, hyperopia, and presbyopia may be ideal candidates for this modality.

Transitioning a patient from other contact lens modalities to scleral lenses generally improves the contact lens experience for patients. A prospective cross-sectional study published in *Contact Lens Anterior Eye* evaluated existing contact lens patients fit with scleral lenses based on a lens selection algorithm.⁹ Overall satisfaction was high in the scleral lens group (≥ 70 out of 100 for 81% of patients [$n = 38$]).⁹ In a study of healthy patients without corneal pathology, patients preferred the performance of a scleral lens (spherical or front-surface toric) compared to previously worn soft toric or gas permeable contact lenses, including patients with no prior history of contact lens wear.¹⁰

Scleral lenses are ideal for presbyopic patients who often have concomitant DED. A variety of multifocal scleral lens designs are available, such as aspheric, center distance, center near, and

center progressive.¹¹ Multifocal scleral lenses can be fit to correct irregular astigmatism because the fluid reservoir neutralizes corneal irregularities. Among patients with normal corneas, ideal candidates for scleral lenses are individuals who have astigmatism and experience fluctuating vision with soft toric lenses, presbyopic patients with DED who wish to continue wearing contact lenses, and contact lens wearers who experience ocular dryness with their existing lenses.

SPECIAL CONSIDERATIONS

Patients who have OSD and other conditions such as ocular rosacea and meibomian gland dysfunction are susceptible to fogging of the anterior surface of the scleral lens. Those with exposure keratopathy after procedures such as ptosis repair, blepharoplasty, and injections of onabotulinumtoxin A (Botox, Allergan) and patients who have experienced a stroke or who have nerve palsy may not close their eyelid completely, resulting in a dry, exposed lens

SCLERAL LENS FAST FACTS

- **SCLERAL CONTACT LENSES DATE BACK TO THE EARLY 1880s AND WERE FIRST MADE FROM BLOWN GLASS.**
- **THE AVERAGE HUMAN CORNEA IS APPROXIMATELY 11.8 MM IN DIAMETER.**
- **THE SMALLEST SCLERAL LENSES ARE APPROXIMATELY 14.5 MM IN DIAMETER, AND THE LARGEST CAN BE UP TO 24 MM.**
- **LENSES THAT ARE 18.00 MM OR SMALLER ARE SUBCATEGORIZED AS MINI-SCLERALS.**

Source: Jedlicka J. Scleral GP contact lenses: How these can help you. All About Vision. allaboutvision.com/contacts/scleral-lenses.htm. Accessed April 17, 2019.

surface. Makeup and skin creams can also contribute to anterior scleral lens debris and fogging (Figure).

Conventional management options for anterior scleral lens fogging are increased lubrication with preservative-free artificial tears throughout the day and removal, manual cleaning, rinsing, and reapplication of the lenses. A

GETTING STARTED WITH SCLERAL LENSES FOR OSD

Following are several useful resources for scleral lens education:

- A book dedicated to scleral lenses with unique perspectives and contributions from international experts titled *Contemporary Scleral Lenses: Theory and Application* edited by Lynette Johns, OD, FAAO, FSLs, and me is available from Bentham Science or Amazon.¹
- *The Clinical Guide for Scleral Lens Success* by Daddi Fadel, DOptom, and me is a hands-on practical resource to use daily in clinical practice.²
- *A Guide to Scleral Lens Fitting Version 2.0*, updated in 2015, by Eef van der Worp BOptom, PhD, FAAO, FIACLE, FBCLA, FSLs, may be downloaded from the Pacific University website.³
- *Scleral Lens Fit Scales* is a guide to estimating clearance. It is available in English and Spanish and may be downloaded from the Ferris State University.⁴

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2. *The Clinical Guide for Scleral Lens Success*. www.scleralsuccess.com/. Accessed April 9, 2019.

3. Van der Worp E. *A Guide to Scleral Lens Fitting*. Forest Grove, OR: Pacific University; 2015. commons.pacificu.edu/mono/10/. Accessed April 9, 2019.

4. Lotoczky J, Rosen C, Norman C. Scleral lens fit scales. Ferris State University website. ferris.edu/HTMLS/colleges/michopt/vision-research-institute/pdfs-docs/Scleral-lens-fit-scales_v2.pdf. Accessed April 9, 2019.

squeegee technique with on-eye surface cleaning may also be used. With this strategy, a lens inserter or remover is moistened with saline and rubbed across the lens surface to eliminate debris, similar to cleaning the windshield of a car to remove debris. Hydrogen peroxide solutions, alcohol-based cleaners, enzymatic cleaners, and extra-strength cleaners such as Menicon Progent (Menicon) are other options for removing surface debris.

Tangible Hydra-PEG (Tangible) is a novel surface treatment that is 90% water and 10% polyethylene glycol. It permanently bonds to the surface of the contact lens upon application. Hydra-PEG shields the lens from the ocular surface and tear film; minimizes friction and deposition; improves lens wettability, tear film breakup time, and deposit resistance; and, ultimately, enhances patient comfort.

A poster recently presented at the Global Specialty Lens Symposium compared lens comfort and symptoms of DED among scleral lens wearers fit with Hydra-PEG–treated lenses and those fit with untreated scleral lenses.¹² Investigators assessed DED signs, comfortable lens wearing time, quality of vision, and lens-related changes to the ocular surface. Patients with treated scleral lenses experienced greater comfort and improved dry eye symptoms compared to those with untreated lenses. Ocular surface changes and the frequency of foggy vision were reduced in the group with treated lenses. The investigators concluded that Hydra-PEG is an effective technology that may improve outcomes for scleral lens wearers who have DED.

More information on scleral lenses is available from the Scleral Lens Education Society (sclerallens.org)

and Gas Permeable Lens Institute (gpli.info). See *Getting Started with Scleral Lenses for OSD* for additional resource suggestions. Scleral lens education is also available at most major meetings.

KEEP SCLERALS IN MIND

Because scleral lenses protect and bathe the ocular surface, they can be a good option for patients with dry eye. ■

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