

Exploring the Therapeutic Applications of Contact Lenses



Learn how you can use contact lenses as medical devices to treat and manage ocular surface disease.

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THE EVOLUTION OF contact lenses has advanced at an exponential rate in the last 30 years. The modern contact lens practitioner has revolutionary designs and materials to correct for a wide range of refractive errors. Specialty contact lenses are routinely used to help improve the vision of patients with corneal irregularities secondary to corneal disease, trauma or surgery. Another application for contacts lenses for today's practitioner is to use contact lenses as medical devices to treat and manage ocular surface disease. This article will cover a wide range of methods for using both soft and rigid gas permeable (RGP) lenses as therapy now, and will explore what may lie ahead in the future.

Types of Soft Contact Lenses

Significant advances have made soft contact lenses effective therapeutic devices. Here are the existing choices.

Disposable soft contact lenses: Having trial lenses available in the office in a wide range of powers is the primary reason for the emergence of using soft contact lenses as therapeutic devices. You have the ability to frequently replace these lenses, especially for those patients who have to wear lenses on an extended wear (overnight) and chronic basis, which is critical to reduce complications secondary to

deposits or lens defects.

Silicone hydrogels: Silicone hydrogel materials have an oxygen transmission four times greater than standard hydrogel lenses. This makes them inherently safer to use for patients who have to wear a bandage-type lens on an extended wear basis. In addition, most patients find these subjectively less drying and are more likely to tolerate them during a therapeutic course.

Silicone Hydrogel Lenses FDA-approved for Therapeutic Use

- Acuvue Oasys (senofilcon A) (Vistakon, Jacksonville, Fla.) 2007
- Purevision (balaficlom A) (Bausch & Lomb, Rochester, N.Y.) 2005
- Night & Day (Iotrafilcon B) (CIBA Vision, Duluth, Ga.) 2003

Custom soft contact lenses: Standard soft contact lens designs are sometimes unable to accommodate and adequately fit eyes with severe irregularity caused by disease, surgery or trauma. A number of contact lens manufacturers, including CIBA Vision (Duluth, Ga.) and Medlens Innovations (Front Royal, Va.), are able to custom-design soft lenses with a wide range of base curves, powers, diameters

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Figure 1. A soft contact lens is the perfect bandage to help relieve symptoms during the acute phase of bullous keratopathy, because the lens protects the eye from exposure, which reduces pain.



Figure 2. To heal a leaking bleb, use a soft contact lens to keep the lids from disrupting the epithelial cells that need to migrate in and heal the wound.

and thicknesses to accommodate and successfully fit almost any patient.

Using Therapeutic Soft Contact Lenses

Corneal abrasions: A corneal abrasion is a painful event that can disrupt vision and be disabling to the patient. There are many causes of corneal abrasion, including trauma, surgery, corneal dystrophy and recurrent corneal erosion. Before the availability of disposable soft lenses, these patients

were routinely pressure patched, which is accomplished by taping a gauze pad over a patient's shut eyelids to prevent blinking. An ophthalmic antibiotic is applied to the ocular surface to prevent infection from opportunistic bacteria before applying the patch. This therapy helps the patient feel more comfortable because it eliminates exposure, but it also helps with the healing process by preventing the blinking lid from disturbing the migrating epithelial cells as they move to cover the wound. Besides the obvious cosmetic issues of wearing a patch, the patient is left without any vision in the treated until it's removed.

You can treat corneal abrasion just as effectively with soft bandage contact lenses, because they eliminate the wound's exposure and create a barrier between the blinking lids and healing epithelial cells. The patient maintains vision and there's no cosmetic factor, which helps with compliance. The other advantage is that you can apply topical ophthalmic antibiotics continuously.

Start with a silicone hydrogel lens with the steeper of the base curve options to avoid excessive movement that has the potential to disrupt the healing epithelium. However, avoid lens adherence, as this may lead to secondary keratitis. If no movement is seen after application of the lens and you're not able to move the lens using the patient's lid with your index finger, switch to a flatter base curve.

Have the patient wear the lens on an extended-wear basis and prescribe a topical fluoroquinolone antibiotic to prevent secondary infection. Frequent follow-ups of 1 to 2 days are needed to monitor the patient's progress and watch for secondary lens-induced complications. Once the cells have completely re-epithelialized, add a drop of topical anesthetic and move the contact lens to the sclera before removal. This will help prevent an erosion of the delicate epithelial cells that have just healed. Prescribe artificial tears during the day and artificial tear ointment at night to the affected eye for 2 to 3 months, while the basal epithelial cells solidify attachment to the basement membrane to prevent recurrent corneal erosion.

Bullous keratopathy: Bullous keratopathy is characterized by painful eruptions of the corneal epithelial surface that result from long-standing and severe corneal edema secondary to Fuch's corneal dystrophy or postoperative complications that damage the endothelium. A soft contact lens is a perfect bandage to help relieve the patient's symptoms during the acute phase. Fit the patient in a silicone hydrogel lens that has 0.25 mm to 0.5 mm of movement. The contact lens protects the cornea from exposure that significantly reduces pain (Figure 1). Have the patient wear the lens on an extended-wear basis, and replace lenses as directed by FDA guidelines. These patients may have to wear the lenses on a continuous basis; otherwise the only other course is corneal transplant.

Dry eye syndrome: Dry eye is a common patient complaint. When it's mild, it's usually addressed treated with artificial tears or punctal occlusion. Some patients have such severe dry eye that their symptoms become disabling. These extreme cases are usually the result of systemic disease, such as autoimmune disorders and Graft-Versus-Host Disease. For these severe cases, in addition to artificial tears, patients use anti-inflammatory drops, such as cyclosporine or preservative-free dexamethasone. Autologous serum drops (made from the patient's plasma and containing essential factors and cytokines that promote corneal health) also can be added 2 to 4 times per day. However, the dryness in some of these patients can be so severe and disruptive to the epithelium that they need bandage lenses.

Fit the patient in a silicone hydrogel lens with adequate centration and movement. Start the patient wearing the lens on a daily-wear basis. They may use nonpreserved artificial tears over the contact lenses as needed. Any prescription drops may be used twice daily before and after lens removal. Prescribe a hydrogen peroxide care system for the lenses that won't introduce preservatives into eyes that are already irritated and sensitive.

A few patients will benefit from wearing the lenses on an



Figure 3. Scleral RGP contact lenses are great for fitting irregular corneas because they rest on the sclera and vault the corneal surface, providing the patient with comfortable wear and stable vision.

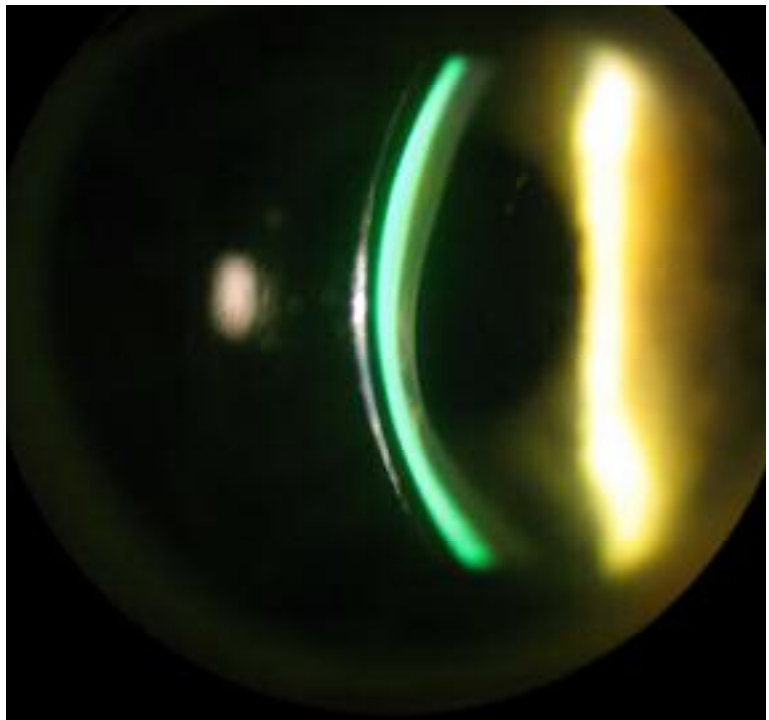


Figure 4. Scleral RGP contact lenses also trap a tear reservoir that masks corneal irregularity and also acts as a bandage for the anterior surface.

extended-wear basis. Frequent monitoring every 6 months after the initial fitting process is necessary to monitor for contact lens-related complications on these compromised corneas.

Leaking blebs: Trabeculectomy is a filtering surgery for patients who have advanced glaucoma. The procedure produces

Soft Contact Lenses for Drug Delivery

The idea of using soft contact lenses as a drug delivery device has been around since they were first introduced over 30 years ago. Approximately 90% of all ophthalmic drugs are prescribed as drops and there are several factors that can reduce their effectiveness as treatment.¹ First, 95% of the drop can be lost due to conjunctival absorption and tear drainage.¹ Other issues include poor patient compliance and inability to effectively self-administer the drops.

A soft lens in the eye that's loaded with medication and able to slowly release it over an extended period of time could drastically improve treatment by exposing the eye to higher drug concentrations and eliminating compliance issues. These types of devices could help patients with glaucoma, dry eye or other anterior segment diseases.

Ideally this could be done using soft disposable lenses that are already in use and proven generally safe; however current research hasn't proven them to be useful for this application. A study recently reported that although silicone hydrogels were able to uptake ciprofloxacin, the release was much too quick for it to be effective.² Scientists will have to come up with a material that not only deposits a drug with an effective time release, but also is relatively safe for the patient to wear. Researchers at Auburn and Florida Universities are working on these products now, but their clinical application may be a decade away.

References

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a drain from the anterior chamber to the subconjunctival space that will fill and produce a bleb. This outflow can greatly reduce a patient's intraocular pressure. Mitomycin, an anti-metabolite, often is applied to the bleb during surgery to

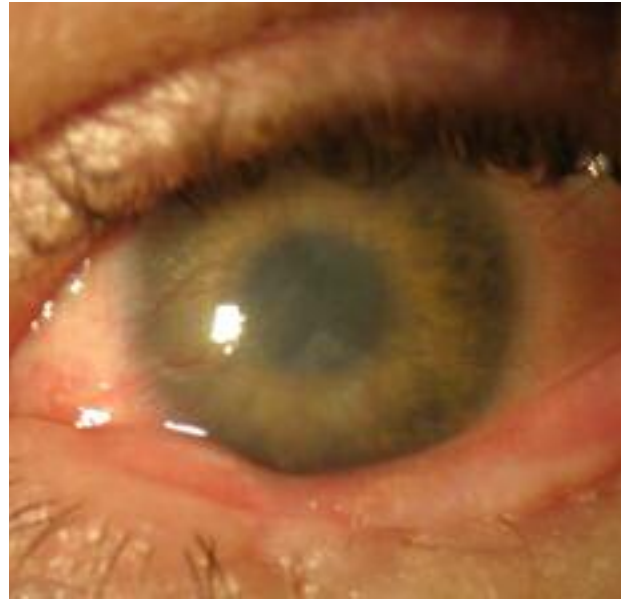


Figure 5. Stevens Johnson Syndrome can cause permanent ocular changes that may lead to vision loss and discomfort. A scleral RGP lens creates a liquid reservoir that's been proven to relieve symptoms.

prevent excessive scarring that can lead to bleb failure. However, mitomycin can increase the risk of a postoperative bleb leak. This is a very serious complication that can lead to ocular hypotony and secondary development of choroidals, as well as put the patient at risk for a bleb infection.

One of the keys to healing a leaking bleb is to keep the lids from disrupting the epithelial cells that need to migrate and heal the wound. This can be done with a pressure patch, but a soft contact lens can be just as effective. For a bleb that's located more toward the limbus, a standard disposable silicone hydrogel will be able to drape over the wound (Figure 2). The patient will wear this on an extended-wear basis until resolution, which can be a week or two. You may need to prescribe larger soft custom lenses with diameters up to 20 mm for blebs that are farther from the limbus. Prescribe a fluoroquinolone to be used q.i.d. to prevent infection and a beta-blocker to reduce aqueous flow, as increased aqueous flow through the wound can delay healing.

Scleral Contact Lenses

Scleral RGP contact lenses (Figure 3), which are defined as having a diameter of 18 mm to 24 mm, are making a comeback into mainstream specialty-lens fitting. Their inherent advantage to fitting irregular corneas is that they rest on the sclera and

vault the corneal surface. This provides the patient with comfortable wear and stable vision. They trap a tear reservoir (Figure 4) that not only masks corneal irregularity, but can also act as a bandage for the anterior surface. The best way to begin fitting these lenses is to call an RGP laboratory that makes them, such as Medlens Innovations or Es-silor of America Inc. (Dallas) and purchase a trial lens set, using their fitting guide for reference. When you first start using these lenses, consultation with the lab will be critical to your success during the learning curve.

Therapeutic Scleral RGP Lenses

Stevens Johnson Syndrome: Stevens Johnson Syndrome is a rare, acute reaction that causes bullous eruptions of the skin and mucous membranes. It may be triggered by medications, such as antibiotics, or viral infection, such as herpes simplex.^{1,2} Ocular involvement has been reported to occur in 50% of cases.³ Permanent ocular changes, such as keratopathy, symblepharon and limbal cell deficiency can cause the patient visual loss and great discomfort (Figure 5). Fit these patients in a scleral RGP to be worn as a daily wear lens. The liquid reservoir that this lens provides has been proven effective for relieving symptoms for these patients.⁴

Dry eye syndrome: For patients who are unsuccessful with soft contact lenses for dry eye treatment, as discussed earlier, try scleral lenses. The scleral lens not only provides dry eye patients with protection from exposure to their compromised cornea, but the cornea is continuously bathed in the liquid reservoir. Patients may use artificial tears with the lenses as needed to lubricate the outer surface and should use artificial gel or ointment at night after lens removal.

Persistent epithelial defects: Persistent epithelial defects (PED) are nonhealing epithelial defects that often result secondary to neurotrophic keratitis or stem cell deficiencies (Figure 6). Healthy corneas will heal a defect within hours or days, but PED may take months or years. PED can be irritating, decrease vision and put the patient at risk for a bacterial infection. Fit these patients in scleral contact lenses, which have been shown to have significant protective value for the pa-

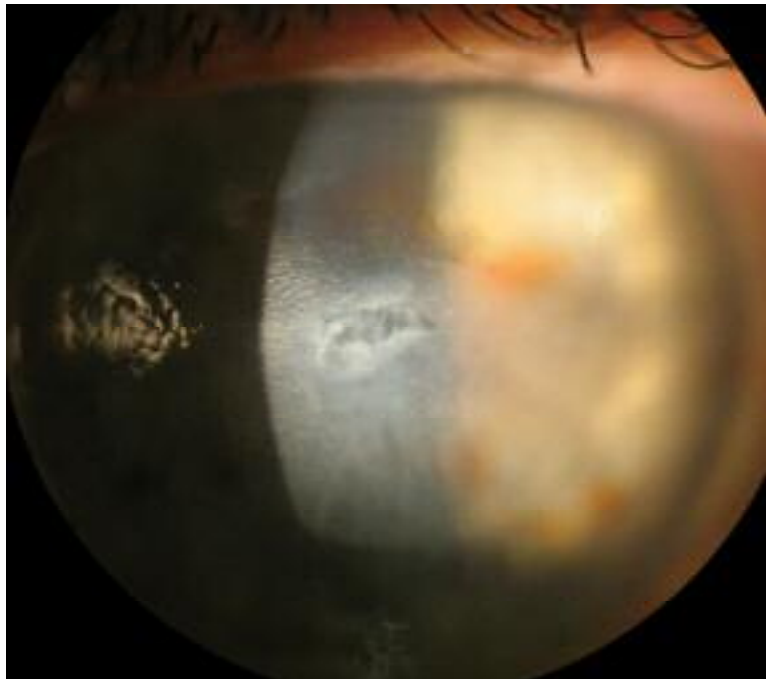


Figure 6. Scleral contact lenses may have a significant protective effect in patients with persistent epithelial defects, secondary to neurotrophic keratitis.

tient.⁵ Consider prescribing a fluoroquinolone antibiotic for the patient to use before and after insertion to prevent opportunistic infection.

Take Your Treatment to the Next Level

Modern soft and scleral RGP contact lenses are no longer thought of as just refractive devices. They're important tools to help you medically manage anterior segment disorders. Take your skills to the next level by incorporating the full diversity of options they offer. **nOD**

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