

HELP FOR DRY EYES

Treating ocular surface disease in glaucoma patients.

BY FRANCIS W. PRICE JR, MD



Dry eye disease (DED) and secondary ocular surface disease (OSD) are common among patients on topical glaucoma therapy primarily because of the preservatives in the eye drops, particularly benzalkonium chloride. Because benzalkonium chloride is essentially a soap, repeated contact leads to irritation and chronic inflammation of the cornea and conjunctiva, which, in turn, amplifies any underlying inflammation and discomfort from DED. The use of nonpreserved glaucoma medications can therefore help decrease DED symptoms, as can mechanically cleaning the lids and lid margins to reduce or eliminate the inflammation and toxicity that result from blepharitis. When these strategies do not resolve the problem, several others may be pursued.

DETECTION

One of the first signs of DED or OSD, easily noted in a busy clinic, is topographic irregularity in the form of irregular mires or an elevated surface regularity index or surface asymmetry index (Figure 1). Topography is also an objective way to determine whether DED treatment is improving the health of the ocular surface. Often, topographic

changes are evident without overt punctate keratitis, which is a sign of more advanced disease (Figure 2).

Topography essentially measures how irregular the ocular surface is. A number of more specific tests help to identify underlying conditions that contribute to DED. Infrared cameras show the meibomian glands and identify dropout. The LipiView Ocular Surface Interferometer (Johnson & Johnson Vision, formerly TearScience) and the Keratograph 5M (Oculus) are currently on the market for this purpose, and a future option is the Examiner (Eidolon Optical).

Tear hyperosmolality and ocular surface inflammation are characteristics of DED. The TearLab Osmolarity System (TearLab) measures the osmolality of human tears to aid in the diagnosis of DED. InflammaDry (RPS) measures matrix metalloproteinase-9, a marker for inflammation. This information helps to diagnose the inflammatory component of DED.

AQUEOUS DEFICIENCY AND MEIBOMIAN GLAND DYSFUNCTION

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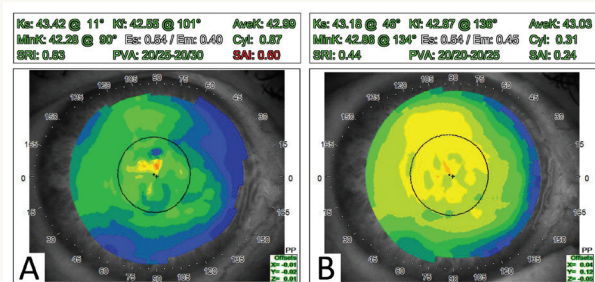


Figure 1. Corneal topography (Tomey) shows irregular patterns on the color simulation of the corneal surface and an elevated surface asymmetry index (A). Topography of the same eye after DED treatment. Note that the amount and orientation of apparent cylinder can change dramatically after appropriate treatment reduces the surface irregularities associated with dryness. Often, the corneal surface irregularities are associated with decreased visual acuity (B).



AT A GLANCE

- Dry eye disease (DED) and secondary ocular surface disease are common among patients on topical glaucoma therapy primarily because of the preservatives in the eye drops, particularly benzalkonium chloride.
- The treatment of DED has classically addressed either aqueous deficiency (not making enough tears) or evaporative dry eyes (losing the tears too quickly), with the latter approach centered on improving the function of the meibomian glands. Most DED patients have a combination of aqueous deficiency and evaporative dry eyes, so the treatment plan is often multifaceted.
- The FDA recently issued marketing approval for a neurostimulator to treat DED. The device may be a more appealing option than topical DED therapy to glaucoma patients who are using two or more IOP-lowering drops.

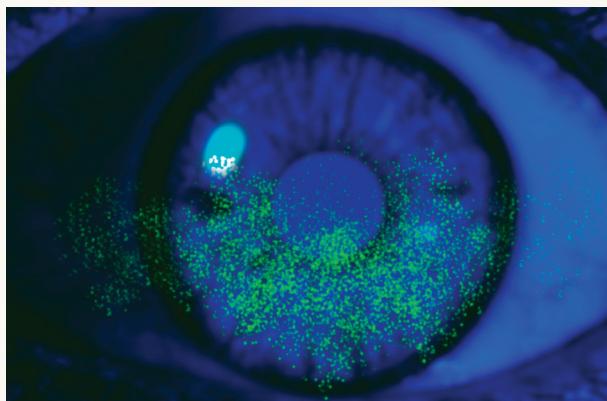


Figure 2. Green fluorescein staining illustrates punctate keratitis.

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A plethora of artificial tear formulations are available. In my experience, products with sodium hyaluronic acid are particularly effective in eyes with severe aqueous deficiency.

Treatments for meibomian gland dysfunction include antibiotics like doxycycline, dietary supplements with omega-3 fatty acids such as fish oil, and/or mechanically expressing the glands to remove old solidified meibum. Manually expressing the meibomian glands, with or without needle-like probes to open them, can cause the patient discomfort.

Two nonpharmaceutical options greatly expand clinicians' ability to rejuvenate the ocular surface by improving the function of the meibomian glands and perhaps the eyelids overall. Intense pulsed light (IPL) therapy, such as with the Lumenis M22 unit (Lumenis), merges aesthetics and therapeutics. Various wavelengths may be used with this device, and one in particular is used to treat both DED and rosacea. For DED, treating a band from ear to ear that goes below the lid margin of the lower eyelid can improve meibomian gland function, and combining this therapy with a full-face treatment can decrease the signs and symptoms of rosacea. Other wavelengths can be used for pigmented lesions, hair removal, and wrinkles. (See *Watch It Now*.)

The LipiFlow Thermal Pulsation System (Johnson & Johnson Vision, formerly TearScience) directly treats all four lids with a combination of heat and pulsed compression to open up and clear out the meibomian glands.

PHARMACEUTICALS

There are two pharmaceutical options for DED treatment. Restasis (cyclosporine 0.05% ophthalmic emulsion; Allergan) inhibits T-cell transcription and thereby

WATCH IT NOW

In this episode of CRST Journal Club, Steven J. Dell, MD, discusses the benefits of intense pulsed light therapy for the treatment of dry eye disease and meibomian gland dysfunction.



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Dell Laser Consultants

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reduces inflammation. The drug was approved in 2003 to increase tear production in patients with decreased tear production secondary to inflammation from keratitis sicca. Last year, Xiidra (lifitegrast 5% ophthalmic solution; Shire) became the first prescription drug approved to treat both the signs and the symptoms of DED. Lifitegrast inhibits T-cell migration.

Because they decrease the inflammation associated with DED, both cyclosporine and lifitegrast are of interest for glaucoma patients. Topical corticosteroid eye drops can also be used to reduce the inflammation of DED, but the approach is off label. Moreover, corticosteroids have the undesirable side effect of raising IOP.

SERUM TEARS

In cases of severe DED that is poorly responsive to the aforementioned treatments, serum tears can be made from the patient's own blood. The process requires regular blood draws, spinning the blood down, and packaging the serum in a sterile fashion so that the patient can use the treatment for an extended period without needing to have blood drawn every few days.

A NEW PLAYER

Adding topical therapy to the medication burden of a glaucoma patient can be problematic. Many of these individuals already use two or more IOP-lowering drops per day. The TrueTear (Allergan) recently received marketing approval from the FDA (Figure 3). This two-pronged handheld neurostimulator has daily disposable tips. The patient inserts the prongs into the nasal cavity, where they contact the ophthalmic branch of the trigeminal nerve and stimulate



Figure 3. The TrueTear.

cranial nerve VII, which innervates the lacrimal glands. Tear production then increases. The tears produced with this treatment appear not to be reflex tears but to have all three component layers of the tear film: oil, aqueous, and mucin (data on file with Allergan). At the Ophthalmology Innovation Summit on May 4, 2017, Vance Thompson, MD, reported that the clinical trial participants did not want to return the device at the end of the study, suggesting that the patients liked this treatment.

STRATEGIC APPROACH

As in the practice of medicine as a whole, taking a careful history is important in DED management. Frequent fluctuations in vision, worsening with visual tasks, and ocular discomfort are key indications of DED. Examining the patient for punctate keratitis, lid abnormalities such as blepharitis, meibomian gland disease, and rosacea can facilitate diagnosis as well as direct treatment. Objective testing depends on which modalities are available.

Treatment is tailored to the patient. No one plan will work for every eye, but often, the same treatments will help most patients. For example, when the meibomian glands are not functioning, they must be opened and cleared, and tear supplements are unlikely to help much. Chronic inflammation must be controlled.

CONCLUSION

Patients' expectations regarding their visual results after cataract, refractive, and glaucoma surgery continue to rise. DED is one of the most significant limitations on visual outcomes. Fortunately, the options for detecting and managing the disease continue to expand. ■

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