

Glaucoma and Dry Eye: A Tough Combo

How chronic glaucoma treatment can give rise to ocular surface disease, and how you can treat them both.

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As our patients age, an increased interest and heightened awareness of the changes occurring on the ocular surface is necessary. It's not uncommon in this older patient population to see age-related changes on the ocular surface that affect the protective and nutrient functions of the tear film. These changes can include laxity of the lids, dropout of the meibomian glands, decrease in goblet cells and an increase in dry eye related to a decrease in acinar cells of both the main and accessory lacrimal glands. In fact, aging itself is a drying process. A decrease in body water in the elderly makes them susceptible to dehydration, and can play a factor in initiating or exacerbating ocular surface disease symptoms such as dryness, burning, stinging, grittiness and foreign body sensation.

Additionally, age is a contributing factor in other ocular diseases such as glaucoma, cataract and age-related macular degeneration, so you're likely to see more than one disease occurring together.

Because both glaucoma and ocular surface disease are highly correlated with the age of the patient, ophthal-



Irritation caused by an incidental touch of the tip of the bottle to the eye or pulling of the lid may be exacerbated in glaucoma patients who require long-term treatment with topical ophthalmic preparations.

mologists frequently see patients treated for glaucoma who are also exhibiting signs and symptoms of ocular surface disease to a greater or lesser degree. While it may be natural to accept this type of patient presentation as a case of one disease causing the other, we must be very cautious not to make the common error of assuming causality, when in actuality the diseases may be concurrent or concomitant. As such, it's important that clinicians attend to each disease

on a case-by-case basis and then alter their treatment strategies accordingly.

Glaucoma and OSD Comorbidity

Ocular surface disease and glaucoma are both prevalent in the elderly and are often comorbidities in the same patient. In the United States, the presence of OSD is estimated to be 15 percent among individuals aged 65 years and older, and is a leading cause of patients' visits to the ophthalmologist.¹ OSD can encompass a variety of ophthalmic conditions, including meibomian gland dysfunction, blepharitis, keratoconjunctivitis sicca, allergic conjunctivitis and thyroid eye disease.

Primary open-angle glaucoma is the second leading cause of blindness in the United States.² Because glaucoma standard of care typically requires long-term treatment with topical ophthalmic preparations, the instillation of drops can also have a detrimental effect on the ocular surface, and pulling on the lids or accidentally touching the tip of the bottle to the eye may cause irritation.

Both OSD and glaucoma have an

age-dependent prevalence, as OSD affects approximately 11 percent of patients between the ages of 40 and 59 and 18 percent of those older than 80, and glaucoma affects approximately 1 percent of patients between the ages of 40 and 49 and 8 percent of patients older than 80 years of age.^{1,3} One recent report found that 66 percent of subjects with severe OSD also have glaucoma, while another report estimated that nearly 60 percent of medically treated patients with glaucoma reported OSD symptoms.^{4,5} The symptoms of OSD can be severe and often debilitating, undoubtedly affecting a patient's quality of life.

As we age, we undergo dramatic decreases in our total body water, which can play a significant role in either causing or exacerbating OSD symptoms. While values fluctuate with regard to both sex and overall body size, it's generally believed that total body water comprises roughly 72 percent of the total body mass of young adults. This hydration factor, however, is not consistent throughout a typical lifespan. At birth, body water is approximately 80 percent of total body mass, while data indicates that our body water decreases to about 60 percent of body mass in adults older than 65 years. In late senescence, body water content is below 60 percent of body mass.⁶⁻¹⁰ This overall loss of body water dries the body out and subsequently may have an effect on the lubrication of the ocular surface.

Improving Quality of Life

The long-term treatment plans for glaucoma with OSD can be challenging, and each patient must be considered individually, based on symptoms and ocular surface changes. As previously mentioned, the age-related nature of glaucoma and OSD increases the risk of having both diseases. Ocular surface status should be evaluated regularly as part of a routine assess-

ment of glaucoma patients to ensure the timely detection and treatment of pathologic signs on the ocular surface, particularly before starting a new topical therapy.¹¹ Most important, setting aside the time to take a thorough medical and ocular health history can lead to an accurate diagnosis and a more rewarding treatment plan. Some patients may not be aware that their ocular complaints are in fact a disease, but will verbalize their symptoms in ways that can point you in the direction of a diagnosis.

It's also useful to provide your patients with all the necessary knowledge to prevent or ease their OSD symptoms. For instance, applying makeup, much like the process of instilling drops, requires a certain amount of concentration that is likely to result in keeping the eye open for extended periods of time, and a poke or a touch to the ocular surface is likely to cause irritation. Additionally, emphasize the importance of maintaining scrupulous eyelid hygiene to prevent potential contamination. Eye makeup should be replaced every four to six months, especially liquid products like mascara, since they can harbor certain bacteria that may be disruptive to the ocular surface.

Warm compresses on potentially affected eyelids and washing the lids with a clean washcloth, baby shampoo, or warm water using a gentle scrubbing motion, is also a useful regimen should irritation caused by bacterial contamination arise. Should a patient notice any changes in the ocular surface such as irritation, redness, swelling or itching, it's important to seek medical attention. The more time it takes for a disease to be diagnosed, the greater the likelihood the problem will become extensive, especially in cases of bacterial infection.

Environmental and situational challenges also have a tendency to exacerbate OSD symptoms. Visual tasks such as reading or using a computer

for an extended period of time can lead to infrequent blinking, which causes the tear film to break up more quickly, generating an unprotected ocular surface.^{12,13} Arid conditions such as airplane cabins can also be problematic for dry-eye patients. Advocating proper rest and hydration may be beneficial to patients with OSD symptoms, since the decrease in body water in the elderly makes them predisposed to dehydration because they have less of a water reserve on which to rely. Early diagnosis and proper identification of potential underlying causes of OSD in glaucoma patients may prevent serious alterations to the patient's quality of life.

Ultimately, it's important to consider all factors (e.g., corneal health, IOP control and patient compliance) when determining the best treatment options for the patient. To accurately assess OSD, patients should be evaluated for ocular surface staining and tear-film breakup time prior to IOP assessments for glaucoma monitoring, as the anesthetic/fluorescein combination used to measure IOP can prevent the physician from accurately assessing ocular surface staining and tear-film breakup time.

Preserving the Ocular Surface

There are a number of options for treating glaucoma, including medications with preservatives, preservative-free drugs and those with soft preservatives. Some literature has described the negative effects of preservatives, particularly benzalkonium chloride, in topical ophthalmic medications. However, the relevance of much of this work to clinical practice remains unclear, as BAK-containing preparations continue to find widespread use in the management of glaucoma and other ocular disorders, due largely to the preservative's superior antimicrobial effectiveness.¹⁴ Because of the difficulties associated with treating



both glaucoma and OSD, however, it's important to have a variety of treatment modalities available for patients with a history of OSD or for those who may develop symptoms of OSD during the course of their glaucoma therapy. Many treatment options, including punctal plugs, steroids and prescription therapies, are available to patients, although most patients can manage their symptoms with over-the-counter tear substitutes to temporarily relieve the clinical signs and symptoms associated with those diseases.

Protecting the integrity of the ocular surface while treating ocular conditions like glaucoma is undoubtedly the wave of the future. Eye drops with additional ocular-surface-protective properties should become a part of an ophthalmologist's armamentarium for patients with ocular surface disorders, and potentially for all patients at risk for ocular surface diseases requiring long-term treatment with drops.

Initially, cationic emulsions were designed to improve delivery of lipophilic drugs to the cornea¹⁵ but they've been found to restore the tear film and exert protective effects on the ocular surface, resulting in improvements in the signs and symptoms of OSD. Catioprost (Novagalina Pharma; Evry, France), a preservative-free cationic emulsion containing 0.005% latanoprost, is being developed to control intraocular pressure while treating ocular surface damage. Preclinical studies suggest that treatment is further enhanced by the surface-protection properties of Novasorb, a patented technology based on cationic emulsion.

Treatment with a cationic emulsion has been shown to relieve symptoms and signs of dry eye, as the oil and aqueous phases of the cationic emulsion provide lubrication to the ocular surface while restoring and preventing evaporation of the tear film. Novasorb was developed to address

the main challenges of topical ocular drug administration (i.e., absorption, drug solubility, patient compliance and high tolerability), and is based on the electrostatic attraction that occurs between the droplets of a positively charged emulsion loaded with active ingredient, and the eye mucus and epithelia, including the cornea and conjunctiva, which are negatively charged.¹⁶


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In a Novagali study using an established primate model of glaucoma, Catioprost was found to be as effective as Xalatan for the reduction of elevated IOP.¹⁷ The company also recently conducted a study to look at the effects of Catioprost and Travatan Z, both BAK-free prostaglandin analogues, on improving IOP and OSD in subjects with glaucoma or ocular hypertension and OSD.¹⁸ Many observers hope that this study will help to address the role of preservative-free therapies in the proper management of glaucoma, while subsequently attending to OSD.

In light of the high prevalence of OSD in glaucoma patients, it's important to assess your patient's glaucoma and potential OSD on an individualized basis. The first step to disease management, however, is fully evaluating glaucoma patients for multiple diseases, taking special care to

note any evidence of OSD. Although glaucoma is a chronic and potentially sight-threatening disease, the impact of OSD on a glaucoma patient's quality of life, particularly regarding symptoms of discomfort, is an important aspect to consider. With the aging population increasing, it's imperative to have a better understanding of patient therapeutic preferences and ocular sensitivities when responding to ocular diseases in the elderly. **REVIEW**

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