Optimizing the Ocular Surface

A healthy tear film improves the surgical outcomes of refractive IOLs.

BY ERIC D. DONNENFELD, MD

The tear film is the most important refracting surface of the eye, and improving it can increase a patient's quality of vision.[1] Estimates suggest that 55 million Americans experience dry eye disease and that it is more prevalent in the cataract age group.[2]

Cataract surgery deleteriously affects the ocular surface due to the neurotrophic effect of the corneal incision and the use of topical medications containing preservatives that can contribute to the development of dry eye disease. More than 50% of patients who undergo cataract surgery may experience dry eye postoperatively.[3] Limbal relaxing incisions and excimer laser photoablation for overcorrection during refractive cataract surgery exacerbate the denervation and substantially increase the risk of ocular surface disease. Improving cataract surgery patients' tear film is even more important when one considers that some refractive IOLs reduce contrast sensitivity.

THE SIGNS AND SYMPTOMS OF DRY EYE AND MEIBOMIAN GLAND DISEASE

The number of symptoms and varying presentations among patients can complicate the diagnosis of dry eye. Visual fluctuation is a critical symptom that is indicative of ocular surface disease. If a patient's vision varies between blinks, from morning to evening, or after prolonged effort (eg, extended time at the computer), the clinician can assume ocular surface disease is present unless proven otherwise.

Several diagnostic tests are available for evaluating the signs of dry eye. Conjunctival staining with lissamine green or rose bengal can facilitate a diagnosis within seconds. Positive staining indicates that the clinician should improve the patient's ocular surface before proceeding with surgery. Other tests include fluorescein corneal staining, Schirmer's testing, tear meniscus and debris, and corneal sensation. Diagnosing meibomian gland disease is easy after evaluating the lid margin for inspissated glands and looking for soapy foam in the tear film.

> "The tear film is the most important refracting surface of the eye, and improving it can increase a patient's quality of vision."

In addition to aqueous deficiency dry eye, meibomian gland disease contributes significantly to ocular surface disease. The symptoms of meibomian gland disease include burning that is worse on waking than later in the day, which is the opposite of aqueous deficiency dry eye. Hot compresses are an essential part of preoperative therapy, and nutritional supplements may be of benefit.

NUTRITIONAL SUPPLEMENTS

Taken as a combination of flaxseed oil (Omega-3 polyunsaturated fatty acids), which thins meibomian gland secretions, and fish oil (eicosapentaenoic and docosahexaenoic fatty acids) to reduce inflammation,[4] nutritional supplements help to optimize the ocular surface and can be used routinely by all cataract patients. Both functions are necessary for optimal results. Patients should only take medical-grade supplements, and they should verify that fish oil supplements are mercury free.

TOPICAL CYCLOSPORINE

An important therapeutic shift in recent years is treating dry eye with the goal of reversing the condition

rather than merely providing palliative lubrication. The key to improving dry eye is immunomodulation with steroids or cyclosporine. Cyclosporine treatment has been shown to significantly improve the ocular surface and visual acuity.[1] Using cyclosporine before and after cataract surgery can improve tear production, corneal staining, and meibomian gland function, with a concomitant and significant improvement in visual outcomes, a reduction in ocular burning and stinging, and an increase in patients' satisfaction.[1] Topical cyclosporine also improves contrast sensitivity and patients' satisfaction when used 2 weeks before and 2 months after the implantation of multifocal IOLs.[5]

> "Before cataract/IOL surgery, patients should exhibit no corneal staining and minimal conjunctival staining, symptoms, and visual fluctuation."

LOTEPREDNOL

Although cyclosporine can reduce ocular burning and stinging as a symptom of dry eye disease, the drops themselves cause significant burning and stinging in approximately 20% of patients,[1] which may affect their adherence to treatment. A multicenter study compared an experimental group initiating loteprednol with another using artificial tears, with both groups starting cyclosporine therapy after 2 weeks.[6] The loteprednol/cyclosporine group experienced a significant improvement in Schirmer's test results and had better vision but with less ocular stinging than the subjects using artificial tears and cyclosporine. There was no increase in IOP with the use of loteprednol for 60 days, which supports the safety of this corticosteroid. Accordingly, combined immunomodulation therapy using cyclosporine and loteprednol, which act on different steps in the inflammatory cascade, should work faster and more effectively than using the drugs as monotherapy.

TOPICAL AZITHROMYCIN

Topical antibiotics, in particular azithromycin, improve the lipid component of the tear film and meibomian gland secretions, thereby improving the ocular surface and quality of vision. Topical azithromycin penetrates and binds to tissue, and it achieves high levels in the meibomian gland.[7] Azithromycin has a profound anti-inflammatory[8] and antibiotic effect, both of which improve meibomian gland disease. My colleagues and I recommend that patients use topical azithromycin once a day and then digitally rub the antibiotic into their lid margin. After following this regimen for 1 month, they stop for 1 month. We reinstitute treatment on a month-on and month-off basis in patients who require chronic therapy. In patients with rosacea, oral doxycycline may be warranted.

IN SUMMARY

Before cataract/IOL surgery, patients should exhibit no corneal staining and minimal conjunctival staining, symptoms, and visual fluctuation. Visual fluctuation is a key symptom of ocular surface disease. The pre- and postoperative use of topical lubricants, nutritional supplements, and immunosuppressive therapy significantly improves visual outcomes in patients with ocular surface disease.

A healthy ocular surface gives every lens technology the best chance of success. By addressing dry eye proactively, we help our cataract/IOL patients see better faster with less discomfort after surgery. By attending to the ocular surface before surgery, ophthalmologists can achieve better measurements with biometry. Improving the ocular surface allows more reliable keratometry, which has replaced axial length as the defining part of IOL calculations. The overall result will be improved surgical outcomes and higher satisfaction among patients. ■

Eric D. Donnenfeld, MD, is a trustee of Dartmouth Medical School in Hanover, New Hampshire, and he is a partner in Ophthalmic Consultants of Long Island in Rockville Centre, New York. Dr. Donnenfeld may be reached at (516) 766-2519; eddoph@aol.com.

1. Sall K, Stevenson OD, Mundorf TK, Reis BL. Two multicenter, randomized studies of the efficacy and safety of cyclosporine ophthalmic emulsion in moderate to severe dry eye disease. CsA Phase 3 Study Group. Ophthalmology. 2000;107:631-639.
2. Report on the Global Dry Eye Market. MarketScope LLC: St. Louis, MO; July 2004.
3. Li XM, Hu L, Hu J, Wang W. Investigation of dry eye disease and analysis of the pathogenic factors in patients after cataract surgery. Cornea. 2007;26:S16-S20.
4. Brown NA, Bron AJ, Harding JJ. Nutrition supplements and the eye. Eye. 1998;12:127-133.
5. Donnenfeld E, Roberts C, Perry H, et al. Efficacy of topical cyclosporine versus tears for improving visual outcomes following multifocal IOL implantation. Paper presented at: The ARVO Annual Meeting; May 6, 2007; Fort Lauderdale, FL.
6. Donnenfeld E, Sheppard J, Holland E. Prospective, multi-center, randomized controlled study on the effect of loteprednol etabonate on initiating therapy with cyclosporin A. Poster presented at: The AAO Annual Meeting; November 9, 2007; San Diego, CA.
7. Foulks GN, Borchman D, Yappert M. Modification of meibomian gland lipids by topical azithromycin. Paper presented at: The ARVO Annual Meeting; May 3, 2007; Fort Lauderdale, FL.
8. Amsden GW. Anti-inflammatory effects of macrolides—an underappreciated benefit in the treatment of community-acquired respiratory tract infections and chronic inflammatory pulmonary conditions? J Antimicrob Chemother. 2005;55(1):10-21.