

The Importance of the Ocular Surface to Outcomes With Premium IOLs and Laser Refractive Surgery

Surgeons should make use of available testing modalities.

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The summer 2011 issue of *OMIC Digest* (Ophthalmic Mutual Insurance Company) reviewed a series of recent refractive and cataract/premium IOL lawsuits. The primary clinical issue was the patients' candidacy. The experts also pointed to faulty judgment on the part of the physician as the most frequent way in which ophthalmologists contribute to claims. Both refractive and cataract surgeons can eliminate many of these issues by carefully analyzing the patient's ocular surface.

OCULAR SURFACE PATHOLOGY

Several categories of ocular surface pathology can degrade the patient's optical quality. In the case of cataract surgery, corneal dystrophies such as keratoconus and previous laser vision correction (LVC) or RK with a decentered, small functional optical zone can lead to poor quality of vision after a premium IOL is implanted. Epithelial basement membrane dystrophy (EBMD), Salzmann nodular dystrophy, preexisting corneal scars, and dry eye disease can have an impact on outcomes after premium IOL implantation and LASIK. All of these conditions can lead to severe visual complaints, but EBMD can result in pain as well: the speculum can cause postoperative lid flaccidity that may lead to recurrent erosions in a previously asymptomatic patient. This is especially true among older patients, whose lids take much longer to recover from the subclinical trauma that the speculum often induces. The clear corneal cataract incision and any limbal relaxing incisions denervate the cornea, adding to the problem as well. It is particularly difficult to convince an asymptomatic older patient who has paid a premium for his or her IOL that the pain and blurred vision are caused by a preexisting dystrophy that has suddenly decompensated. Eyes with EBMD will likely decompensate

after cataract surgery with a standard IOL as well, although the postoperative vision of these patients will not be as compromised as if they had had a multifocal IOL inserted. Nighttime ointments will usually prevent painful episodes of recurrent erosion after cataract surgery in patients with EBMD. They should be warned in advance of cataract surgery, however, that they have a progressive dystrophy that makes them a poor candidate for a multifocal lens and that may require repeated corneal debridements and possibly phototherapeutic keratectomies after surgery.

TESTS TO AVOID PROBLEMS

To avoid these poor outcomes, several tests can be performed in virtually any ophthalmologist's office, including the 20-second fluorescein test, corneal topography, and tear osmolarity.

Fluorescein

The first test is performed with fluorescein. After instilling a topical anesthetic and touching the conjunctiva with a fluorescein strip (I prefer a liquid combination of both products for speed and consistency, fluorescein sodium and benoxinate HCl ophthalmic solution, 0.25%/0.4% [Fluress; Akorn, Inc.]), the clinician holds open the patient's lids while observing the corneal surface for at least 20 seconds. Often, when the excess liquid runs off, corneas that first appeared normal will exhibit negative fluorescein staining, that is, the absence of staining in a map, dot, or fingerprint pattern within an otherwise even layer of fluorescein, as is so characteristic of EBMD (Figure).

Any more than an extremely mild case of peripheral EBMD in a very old patient should be considered a contraindication for a premium IOL. If the dystrophy is mild and peripheral, it will not affect the premium IOL's

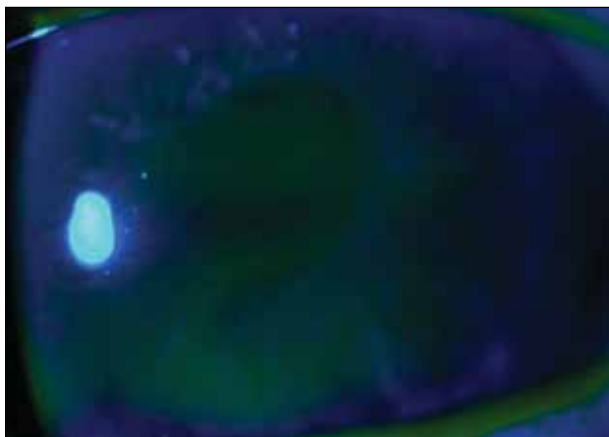


Figure. Negative fluorescein staining is characteristic of EBMD.

optics, and if the patient is quite elderly, the dystrophy is unlikely to suddenly involve the central cornea. Patients should be informed that they have EBMD, a progressive dystrophy, even those who will receive a monofocal IOL. They may experience recurrent erosions postoperatively that require a bandage contact lens, nighttime ointment, epithelial debridements, stromal punctures, or excimer laser phototherapeutic keratectomies in the future. These patients should be informed that their dystrophy can cause problems with the accuracy of the IOL calculations that may require an LVC enhancement.

Corneal Topography

The second test is corneal topography. The surgeon should be sure to view the maps in the axial display mode, with the individual colors set to 1.50 D intervals. The axial mode will neither disguise true pathology nor exaggerate details that are within normal limits. The proper color palette using contrasting colors also helps in this regard.¹

Most topographers include software programs designed to help the ophthalmologist make clinically significant diagnoses. These programs can be neural network systems working with “fuzzy logic” algorithms. In many cases, the systems have been trained on hundreds of normal as well as keratoconic, post-RK, and post-LVC eyes; some topographers distinguish between these four groups and more.

At first glance, it must seem like a waste of time and effort for companies to have developed corneal topographic software programs that detect previous refractive surgery. Wouldn't the patient simply tell the surgeon? Incredibly, some patients who had PRK or LASIK in the 1990s forget to tell their cataract surgeons. Because prior LVC is a relative contraindication to premium IOLs, it is critical to detect this history in advance of surgery.

Many topographers also provide a potential visual acuity (PVA) range that is helpful for preoperative surgical planning. The PVA tells the surgeon what level of BSCVA this eye should have, assuming clear media and a healthy retina. Normal corneas will produce a PVA of no worse than 20/30; any range worse than this should be investigated thoroughly to avoid postoperative disappointment. In many cases, a slightly but mysteriously low PVA range is indicative of EBMD, so this slightly low PVA can be helpful in pointing the surgeon in the proper direction, that is, to take another 20-second look at the cornea after fluorescein instillation.

Dry Eye Testing

Lastly, there are new tools to help the surgeon identify dry eye disease, which, left untreated, is also a relative contraindication for premium IOLs and LVC. Tear osmolarity testing has the highest predictive value of all the standard tests (Schirmer scores, tear breakup time, etc.) and is now commercially available. It takes only moments for a technician to perform this test. Soon, a test for matrix metalloproteinase-9 levels in the tears—a marker for inflammation—will be available in the United States. Patients with DED can be treated with cyclosporine emulsion, artificial tears, nighttime ointments, liposome spray, omega-3 nutritional supplementation, punctal plugs, hydroxypropyl cellulose inserts, and other therapies. Some or all of these therapies can convert a suboptimal candidate for a premium IOL or LVC into a good one. One word of caution: unless these patients commit in advance to staying on their therapeutic regimen for the long term, they may eventually become unhappy with their quality of vision after premium IOL or LVC surgery.

SUMMARY

A careful evaluation of the patient's ocular surface is an extremely important part of the workup for cataract and refractive surgery. Discussing preexisting pathology in detail with patients, setting their expectations, and making a realistic estimate of their capacity for long-term compliance are also crucial. ■

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1. Smolek MK, Klyce SD, Hovis JK. The universal standard scale: proposed improvements to the ANSI standard corneal topography map. *Ophthalmology*. 2002;109:361-369.