How Spectral-Domain OCT Has Changed My Practice

This new technology aids the correct diagnosis of various ocular pathologies.

BY STEVEN G. SAFRAN, MD

When spectral-domain optical coherence tomography (SD-OCT) hit the ophthalmic arena, I thought the images were impressive. I felt confident, however, that my ability to examine the retina at the slit lamp was good enough that I could directly visualize important pathology without this new technology. OCT appeared to be useful for relatively rare patients in whose eyes I could see some sort of pathology but for whom I had no definite diagnosis. Those patients could be referred to retina specialists when needed. I was sure that I could discern epiretinal membranes (ERMs), cystoid macular edema (CME), age-related macular degeneration, and retinal pigment epithelial detachments as well as most other major pathology with enough acumen that adding OCT would have little effect on my surgical outcomes.

I was wrong. This article describes my experience with the Spectralis SD-OCT system (Heidelberg Engineering, Inc., Germany).

WHAT I LEARNED

After 18 months of using SD-OCT in my practice, I learned that this technology is indispensable to comprehending what is happening at the level of the macula and optic nerve. SD-OCT images have redefined my understanding of a patient's pathology and completely changed for the better my approach to a patient's care. I strongly

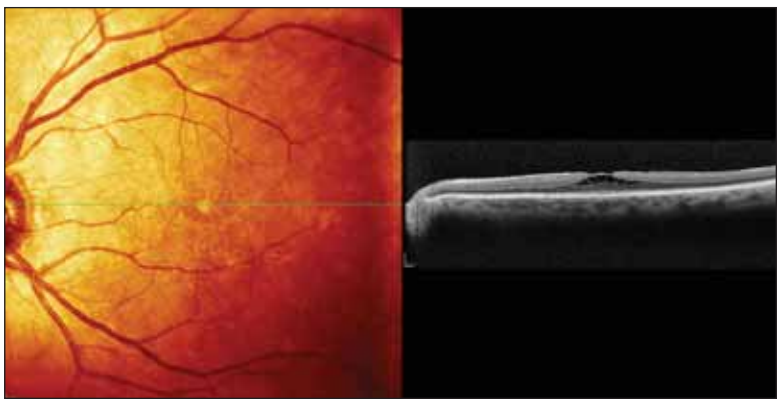

Figure 1. A patient presents with a moderate cataract and 20/40 vision. She is interested in surgery with a presbyopia-correcting IOL. She has mild ERMs, but a Spectralis image shows that the effect this has on her macular architecture is quite significant.

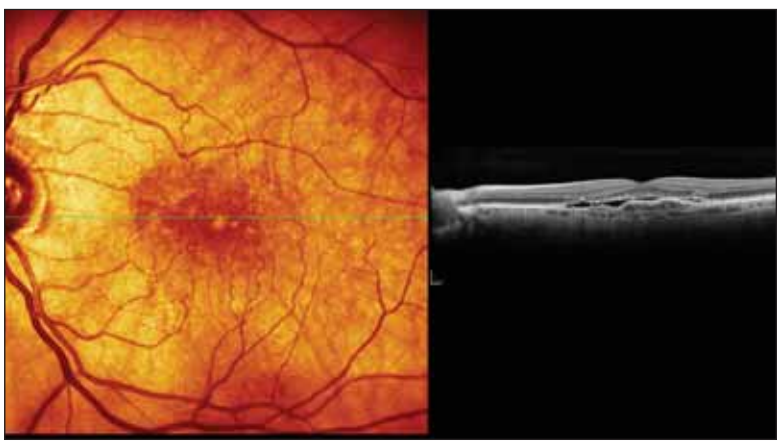

Figure 2. A Spectralis image of a patient after cataract surgery who presented with mild changes on examination. The patient achieved 20/25 vision but had a subretinal net with fluid.

believe that all patients who come in for a premium lens consultation or for a second opinion due to any implant-related problem need to undergo OCT and, ideally, SD-OCT imaging before the provision of a surgical recommendation.

The advent of premium lenses has changed the way patients and physicians view cataract surgery. Patients have high postoperative expectations and a low tolerance for unexpected pathological discoveries after surgery. When patients are unhappy with their vision after cataract (or refractive) surgery, they are quick to blame the implant or the procedure and the physician, too. We ophthalmologists are learning that the three most important factors in satisfying patients are an achieved refractive target, a healthy ocular surface with a good-quality tear film, and a macula that is capable of functioning at a level that provides excellent vision. In my opinion, SD-OCT is becoming fundamental in the assessment of macular anatomy as it relates to functional performance.

PREOPERATIVE EVALUATION

The most common pathology in cataract surgery patients is ERMs. Through the use of SD-OCT, I have learned that, with regard to ERMs, there is a poor correlation between what I see on retinal examination (or on fundus photography) and the actual effect the ERM has on the macula's architecture. Patients with impressive ERMs upon clinical examination may have absolutely normal macular anatomy and be excellent candidates for premium IOLs. On the other hand, I see many patients with seemingly mild ERMs for whom the Spectralis shows macular architecture markedly affected in a way that is likely to compromise visual function (Figure 1). Similarly, with age-related macular degeneration, clinical examination may reveal little about the true severity of the disease. Patients with what appear to be relatively minimal changes on examination may have more critical changes as seen with the SD-OCT than those with more impressive slit-lamp examinations. The severity of what I see on clinical examination does not always correlate with the level of pathology revealed by the Spectralis (Figure 2).

Screening prior to surgery with the SD-OCT can also detect a lamellar macular hole, vitreomacular traction syndrome, and an occult fluid leak from central serous retinopathy as well as occult serous retinopathy or a subretinal nevus (Figures 3 and 4). Because patients with these pathologies will have less-than-perfect vision after cataract surgery, it is critical to factor them in when considering an implant and guiding patients' postoperative expectations. For example, a diffractive multifocal implant would be a poor choice for a patient with limited visual potential due to the presence of a lamellar macular hole.

I find that the Spectralis is extremely accurate in identifying occult optic neuropathy and damage due to glaucoma. Scans of the nerve fiber layer enable me to precisely evaluate damage to the nerve from old optic neuritis or neuropathy. We can also observe global and sectoral changes to the nerve fiber layer as they pertain to glaucomatous damage, and we can evaluate patients with disc drusen for nerve fiber layer defects.

Figure 3. A Spectralis image of the eye of a patient who presented after cataract surgery with decreased vision and a vitreomacular traction syndrome that would have been undetectable on clinical examination.

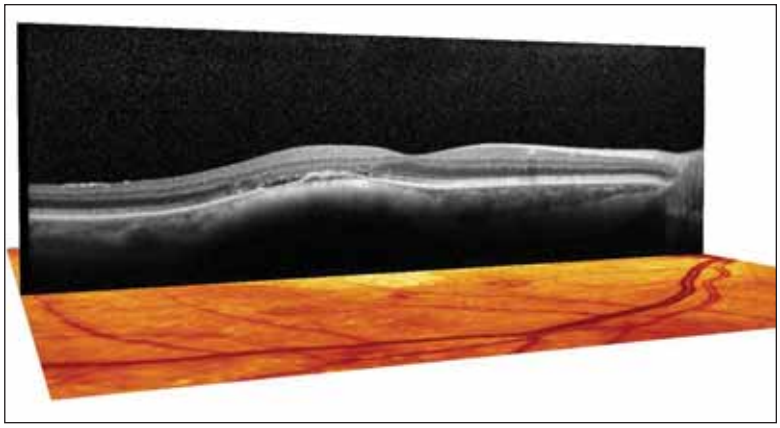

Figure 4. A Spectralis image of the patient's dominant eye after surgery with the Crystalens (Bausch + Lomb, Rochester, NY) shows a choroidal nevus with a subretinal net and occult leakage. She was treated with Lucentis (Genentech, Inc., South San Francisco, CA).

POSTOPERATIVE EVALUATION

If a patient is not seeing as well as expected after cataract surgery, it is imperative to determine what is happening at the level of the macula. I see many patients for second opinions due to their dissatisfaction with previous cataract surgery. The first two tests I perform are corneal topography and SD-OCT with the Spectralis. In a majority of cases, these examinations reveal the problem, which usually pertains to the ocular surface or macula. CME after cataract surgery is often apparent on clinical examination, but the amount of edema cannot be quantified without OCT measurements. The eye-tracking capability of the Spectralis allows me to obtain a high-quality image and then return to the exact same spot in the retina at a later date for a comparative evaluation. With this information, I can quantify CME and evaluate the response to treatment. I can then modify the treatment plan as needed. I find these capabilities particularly valuable in patients with diabetic macular edema.

CONCLUSION

My experience with the Spectralis has taught me a great deal about macular pathology and how better to clinically evaluate patients at the slit lamp. This technology has made a therapy-guiding difference for scores of my patients. I would be reluctant to recommend a premium lens or IOL exchange to a patient without knowing what his or her macula looked like with SD-OCT imaging. ■

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