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 (SDOCT) 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. Optical coherence tomography (OCT) appeared to be useful in relatively rare patients in whose eyes I could see some sort of pathology, but for whom I had no definite diagnosis and those patients could be referred to retina specialists when needed. I was sure that I could discern epiretinal membranes (ERM), cystoid macula 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, Vista, CA).

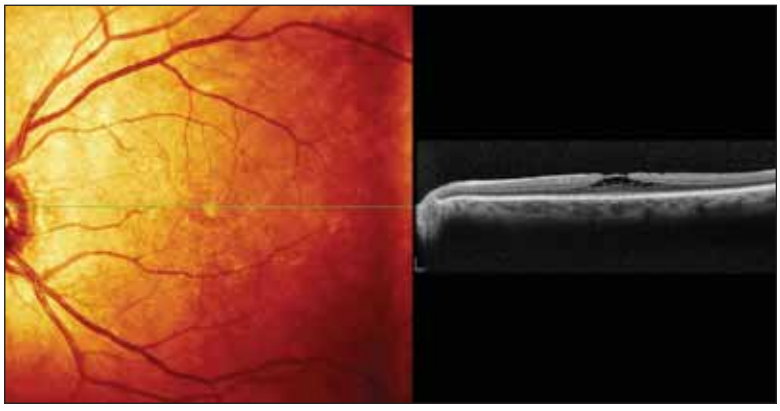

Figure 1. A patient presents with a moderate cataract, 20/40 vision, and is interested in surgery with a presbyopia-correcting IOL. She has a mild ERMs but a Spectralis image shows that the affect this has on her macula architecture is quite significant.

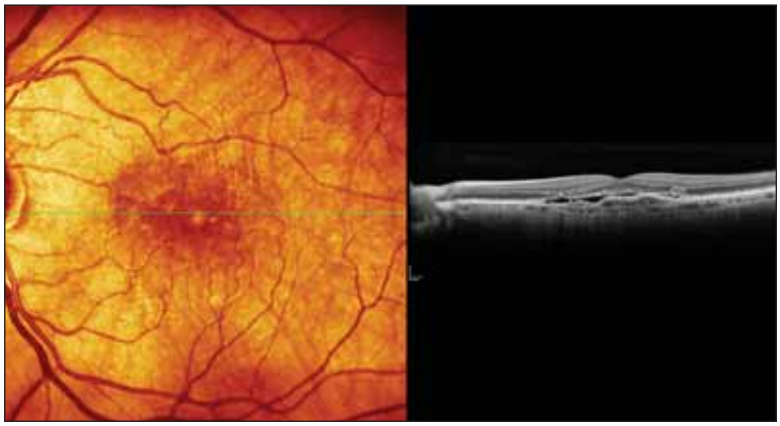

Figure 2. A Spectralis image of a patient after cataract surgery presented with mild changes on examination.The patient achieved 20/25 vision, but had a subretinal net with fluid.

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 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 goodquality 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 retina 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 impressiveslit-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 SDOCT 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 us 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.

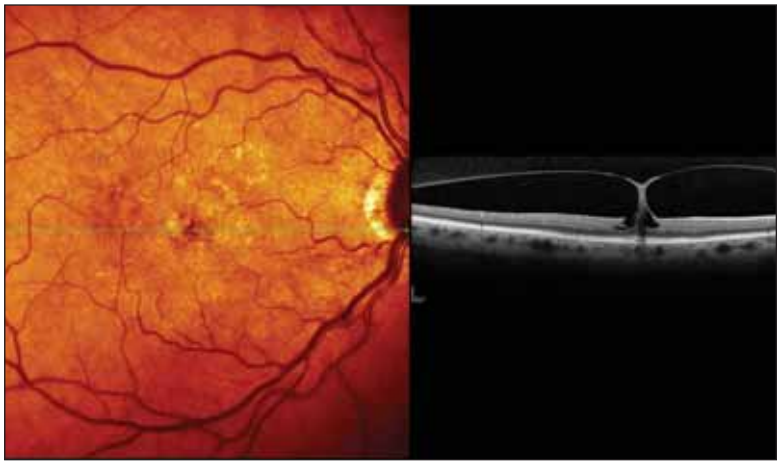

Figure 3. A Spectralis image of a patient who presented after cataract surgery with decreased vision and a vitreomacular traction syndrome that would have been undetectable on clinical examination.

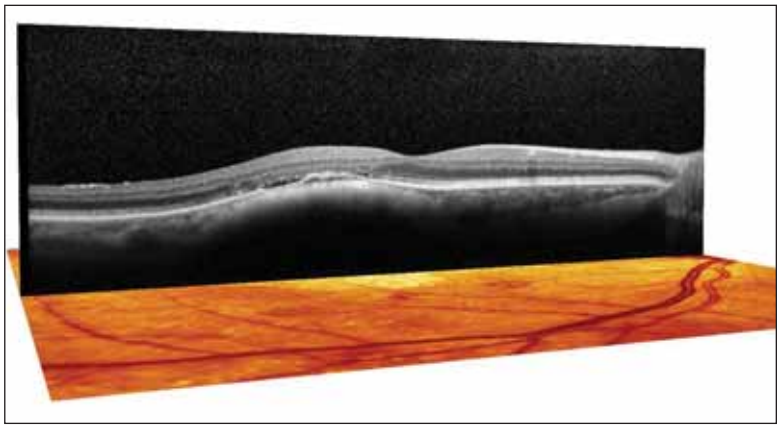

Figure 4. A Spectralis image of a patient after undergoing surgery with the Crystalens (Bausch & Lomb, Rochester,NY) has a choroidal nevus in the right (dominant) eye with a subretinal net and occult leakage. She was treated with Lucentis (Genentech, Inc., San Francisco,CA).

3D OCT-2000 SYSTEM RECEIVES FDA CLEARANCE

By Malaika David, Associate Editor

Topcon Medical Systems, Inc. (Paramus, NJ), received 501(k) marketing clearance from the FDA for the 3D OCT- 2000 System. The successor to the 3D OCT-1000 has several new features. According to the company, the 3D OCT-2000 has the ability to image and visualize large areas of the macula and optic nerve in high resolution on an integrated touch screen display. It also incorporates enhanced registration and noise-reduction software for optical coherence tomography (OCT) B-scan and 3D images. The system's nonmydriatic color fundus camera with a high-resolution Nikon D-90 12.3-megapixel sensor (Nikon Corporation, Tokyo, Japan) can detect and display retinal abnormalities usually hidden from OCT imaging. The combination of a fundus camera and sensor also allows users to take sequential stereo disc color photographs.

The 3D OCT-2000 can be integrated within a clinical or academic network and is designed to be fully compatible with electronic medical record systems and Topcon's EyeRoute Ophthalmic Image Management System. According to the company, using the 3D OCT-2000 ensures fast office workflow.

When used with Topcon's FastMap software, the 3D OCT-2000 captures images that can be viewed and compared with simultaneous dynamic visualization of OCT. The software displays fundus and thickness map imaging for both eyes on the same screen or on serial exams from the same eye. It also enables the 3D OCT-2000 to create 2D and 3D videos.

Cataract & Refractive Surgery Today asked Daniel S. Durrie, MD, clinical professor of ophthalmology at the University of Kansas Medical Center and leader of Durrie Vision in Overland Park, Kansas, how he uses the 3D OCT-2000 in his practice.

"This is an extremely valuable tool for screening patients to make sure they are good candidates for refractive surgery and also for evaluating their whole ophthalmic system," said Dr. Durrie. "We get a test on every patient, from teenagers to patients in their 70s or 80s. By getting a picture every single time, I know all the normal variants, and I can help patients in understanding their optical systems."

"Topcon is always striving to provide the best possible products to meet the current and future needs of our customers," asserted Robert Gibson, senior director of marketing and strategic planning at Topcon in an e-mail to CRSToday. "Several of the new features incorporated into the 3D OCT-2000, such as the new scan patterns and the 12.3 MP color camera, were from requests of our customers. Other features, such as the automatic capture controls and color touch screen capture interface, are features consistent with Topcon's goal to ensure that all of our products, even the most advanced 3D OCT systems, are extremely easy to use and are of the highest quality so that the product will last a long time."

Mr. Gibson wrote that "more and more cataract and refractive surgeons are using 3D OCT before surgery to evaluate the retina to determine if there are any conditions that could jeopardize the success of their surgery."

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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 observed 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 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 to better 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 looks like on SD-OCT imaging. ■

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