Practical Applications of SD OCT in the Diagnosis and Management of Retinal Disease

The Spectralis HRA+OCT combines improved imaging and eye-tracking to improve detail and accuracy of retinal imaging.

BY JEFFREY S. HEIER, MD

Ophthalmic imaging has evolved rapidly in recent years. There is an exciting synergy between the newest development in retinal imaging, spectral domain (SD) optical coherence tomography (OCT) and the range of new, effective retinal therapeutics.

Today's technology can help doctors more effectively identify at-risk patients, measure therapeutic responses, and probe potential treatment combinations. Less than 5 years ago OCT redefined the way we managed neovascularization and edema as they relate to a variety of retinal diseases. Now, SD OCT is showing us structure and detail that has never been seen before and is rapidly being adopted in specialty and general practice settings.

In our practice, we use the Spectralis HRA+OCT (Heidelberg Engineering, Vista, CA). The images we are seeing are truly spectacular, but before we decided to fully adopt the Spectralis, we had to determine what these images are telling us, and whether the SD OCT images provide benefit over time domain OCT—an important step in the assessment of any new technology.

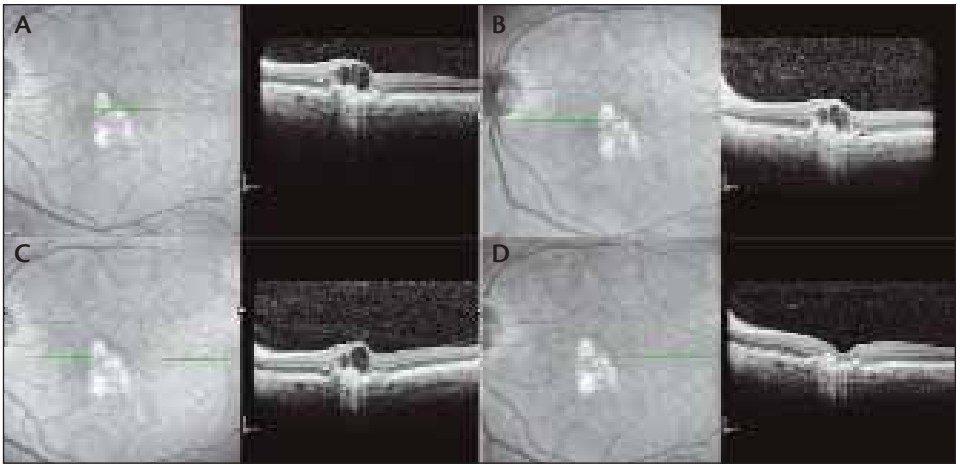

Figure 1. Wet AMD. Intraretinal fluid secondary to new onset CNV (A). Persistent intraretinal fluid 1 month after first injection of ranibizumab (B). Persistent intraretinal fluid after three injections of ranibizumab (C). Fluid resolution after photodynamic therapy combined with ranibizumab (D).

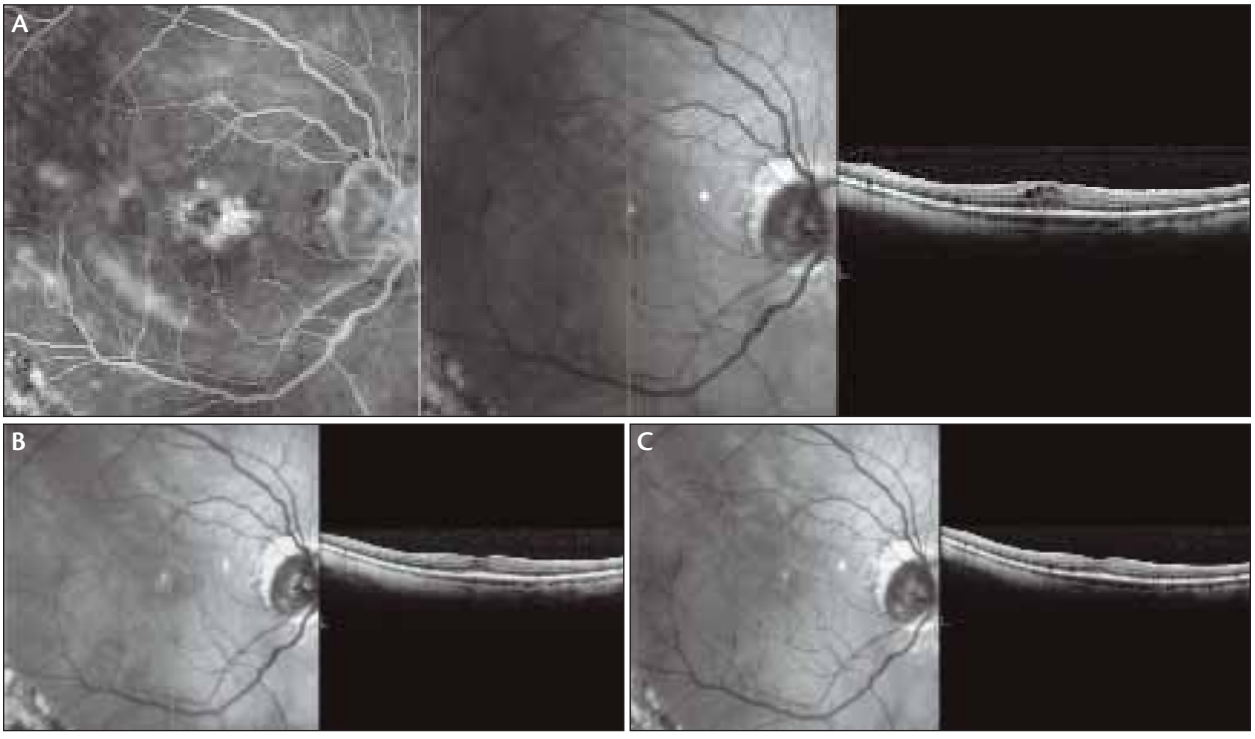

Figure 2. Pseudophakic cystoid macular edema (CME) (A). Decreased CME 30 days after initiating topical therapy (B). Resolution of CME 90 days after initiating topical therapy (C).

EYE-TRACKING CAPABILITIES

In addition to the improved resolution, we have found the real-time eye tracking and volume scanning capabilities of the Spectralis offer a clinical advantage. The high-resolution volume scans enable us to see minute alterations and subtle pathology in the retina that we were previously unable to detect. The active eye-tracking ensures that anomalies in the scans are truly structural and not just motion artifact. Active eye-tracking also allows the system to have a precise automatic rescan function that places follow-up scans in precisely the same location as previous scans, thus ensuring that changes seen and measured are true changes in structure and not motion or image placement error.

The ability to confidently distinguish even small increases or decreases in subretinal fluid has improved my ability to diagnose and manage our patients with age-related macular degeneration (AMD). I find the volume scans in these SD OCT images to be incredibly helpful in detecting small amounts of fluid and pathology that we would not have seen otherwise in these patients. This has actually improved workflow, as we no longer need to order fluorescein angiograms (FAs) in such cases, but often rely on the volume scan to detect recurrences. Although we continue to rely on FAs to diagnose new disease or evaluate significant unexplained changes, the ability to detect subtle recurrences–often in different areas of the retina from previous abnormalities–is extremely helpful. No longer are we relying on imaging 2% to 5% of the macula, as is the case with the Stratus. We are now able to scan the entire region and pick up subtle abnormalities, which allows us to directly tailor our treatment and diagnosis of patients with AMD.

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In my practice, we are able to run a volume scan or stacks of parallel B-scans of the patient, highlight one of the scans provided by the SD OCT, and control the volume scan and where we would like the imaging to stop. We can selectively review potentially pathologic areas, and control selection from the exam station to use any one of the images for a reference point. These reference scans allow us to highlight where pathology is, allowing the practitioner to reference and track an image on sub-

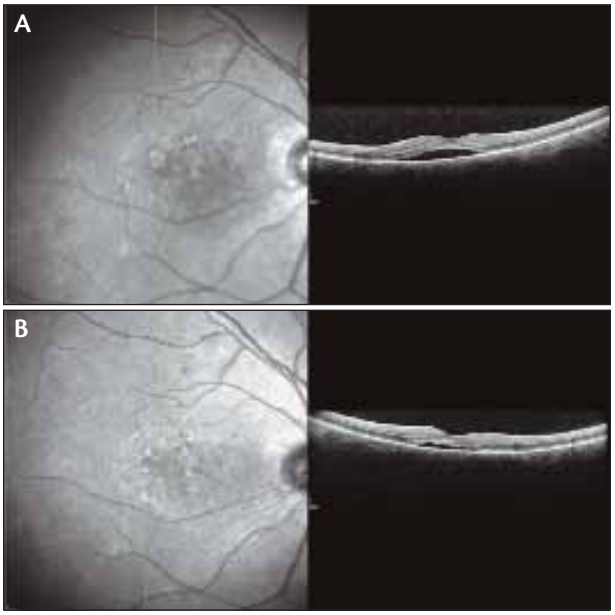

Figure 3. Central serous retinopathy. Subretinal fluid (SRF) secondary to chronic CSR (A). Decreased SRF at 6 week follow-up without intervention (B).

sequent visits. Not only does this provide us with a qualitative image, but also a quantitative measurement.

CASE IN POINT

In my practice, we use Spectralis for diagnostic imaging, and there have been several cases that have underscored the advantages of volume scanning. Diagnoses, treatments, and outcome measurements have all been affected by these innovations.

For instance, a patient with exudative AMD who had a suboptimal response to ranibizumab (Lucentis, Genentech) came into my office. We tracked him over time and observed the absence of fluid resolution (Figure 1). It was important to first document that there truly was no improvement when treated with ranibizumab. The patient was then offered an investigational treatment for suboptimal responders (integrin inhibition), and modest but steady decrease in fluid was seen. In patients such as these, it is important to be able to demonstrate biologic activity in the face of significant retinal disease and have confidence that the changes are real. This is important for both the patient and the study, because many early phase trials are offered to patients with chronic disease in whom visual acuity changes and anatomic responses are difficult to document.

In a second case example, I was treating a patient with pseudophakic cystoid macular edema with a topical steroid and nonsteroidal antiinflammatory drug. As a result of SD OCT volume scanning, I was confident that the patient was demonstrating steady anatomic improvement on topical therapy (Figure 2). As a result, continued topical therapy was recommended, and the patient ultimately experienced visual improvement. Had I not been able to confidently show an anatomic response, I would likely have switched therapy.

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The final case I will discuss involves a patient who had central serous retinopathy and demonstrated improvement in fluid without significant visual change. She had been followed for over 6 months, and felt she was not improving, yet the reference scan demonstrated that she was clearly improving (Figure 3). If I had not been certain that I was viewing the same scan on the SD OCT, I would have been doubtful the patient was improving, albeit slowly, and would have considered intervention.

CONCLUSION

The ability to discriminate the finest points of pathology with our eye-tracking and the Spectralis SD OCT has turned our retinal scans from promising indicators into true decision-making tools. As diagnostic imaging continues to advance, we will see more changes in the way retinal specialists diagnose, treat, and assess their patients. ■

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