

Diagnostic OCT

How this technology can assist the pre- and postoperative management of cataract surgery patients.

BY IVAN J. SUÑER, MD

Optical coherence tomography (OCT) is a noninvasive technique based on the principle of laser interferometry. The technique is similar to ultrasound but uses light instead of sound. The StratusOCT (Carl Zeiss Meditec, Inc., Dublin, CA) facilitates the detection of retinal diseases by providing cross-sectional images of the retina that may be used for objective measurements and clinical evaluation. Cataract surgeons can use this technology as a means of assessing patients pre- and postoperatively in order to manage them more effectively.

PREOPERATIVE DIAGNOSIS

Background

Many patients who undergo cataract surgery also have pre-existing retinal disease, which can lead to sub-optimal visual acuity postoperatively. The ability to diagnose retinal disease preoperatively enables physicians to temper patients' expectations and to refer individuals to a retinal specialist when necessary. In cases of suspected retinal pathology or when patients' visual acuities are worse than would be expected from their degree of cataract, OCT can reveal subtle retinal pathology that may be easily missed by clinical examination alone.

Case No. 1

A 58-year-old male has a history of progressively worsening vision in his left eye. He presents for cataract surgery evaluation with a BCVA of 20/70 OS, a mild cataract, and a small spot on his retina. OCT reveals a full-thickness macular hole and vitreomacular traction (Figure 1). This patient must understand that cataract surgery will not yield 20/20 UCVA, and he should be referred to a retinal specialist.

Case No. 2

An 88-year-old male presents with a complaint of distortion in his left eye. He has

BCVAs of 20/25 OD and 20/30 OS. Drusen are evident in both eyes. Imaging with OCT reveals the normal foveal depression in his right eye and an epiretinal membrane in his left eye, as well as the bilateral presence of drusen. The patient should be counseled that, given his multiple retinal pathologies, he may not achieve 20/20 UCVA after cataract surgery.

Case No. 3

An 88-year-old female presents with 20/100 BCVA and a complaint of progressively worsening vision in her right eye. Clinical examination reveals cortical changes of the crystalline lens. The OCT map reveals that an epiretinal membrane is causing traction and distortion in the macula. The physician should counsel the patient that cataract surgery may improve her vision but that she may also require a retinal procedure.

POSTOPERATIVE DIAGNOSIS

Background

Patients who experience difficulty with their vision after undergoing cataract surgery often have macular disease, most commonly cystoid macular edema (CME). Surgeons should suspect retinal pathology when the patient has risk factors such as diabetes or intraopera-

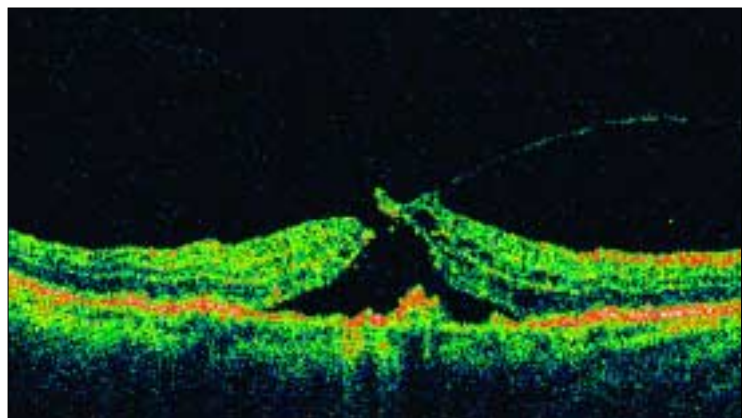


Figure 1. OCT imaging reveals a full-thickness macular hole with vitreomacular traction.

tive vitreous loss. In such cases, OCT again can be a valuable diagnostic tool. Fluorescein angiography can serve as a helpful adjunct, but this is an invasive, time-consuming procedure.

Case No. 1

A patient's UCVA decreases to 20/100 6 weeks after uncomplicated cataract surgery. The early frames of the angiogram show pinpoint hyperfluorescent spots around the fovea, and the later frames of the angiogram reveal the classic petalloid pattern of CME. The retinal map on the OCT shows a large, white spot centrally, indicating elevation in the fovea. The OCT's cross-sectional images of the retina demonstrate extensive cystoid changes.

The patient receives 4 mg of intravitreal triamcinolone acetonide. One month later, her vision has improved to 20/25. OCT shows the appearance of the normal foveal depression on the retinal map and restoration of the foveal architecture on cross-sectional images, with resolution of the cystoid changes.

Case No. 2

A 76-year-old female achieved 20/25 UCVA OD after cataract surgery. Her UCVA has decreased steadily to 20/60 over the previous 3 months. Late frames of the fluorescein angiogram show leakage in the fovea, and OCT demonstrates retinal thinning and large cystoid changes. One week after an intravitreal injection of triamcinolone acetonide, the patient's UCVA improves to 20/50, and OCT demonstrates a restoration of the foveal contour. Three months later, the patient's UCVA has improved to 20/40, and the clinical examination is unremarkable. Imaging with OCT, however, reveals a subtle recurrence of cystoid changes, indicating the recurrence of CME. The patient receives another injection of triamcinolone acetonide. Her UCVA improves to 20/30, and the foveal architecture is once again restored.

Case No. 3

After receiving focal and grid laser treatment to stabilize his macular edema, a 46-year-old male with insulin-dependent diabetes mellitus undergoes cataract surgery in his left eye. His UCVA is 20/60 at 1 month. Some dot-blot hemorrhages and hard exudates are evident on retinal examination. The angiogram shows a great deal of late, diffuse leakage. The OCT retinal map shows elevation at the fovea, and the cross-sectional images of the retina reveal extensive cystoid changes, some subretinal fluid, and a retinal thickness of approximately 600 μm (Figure 2A). These findings are consistent with CME as well as a recurrence of diabetic macular edema.

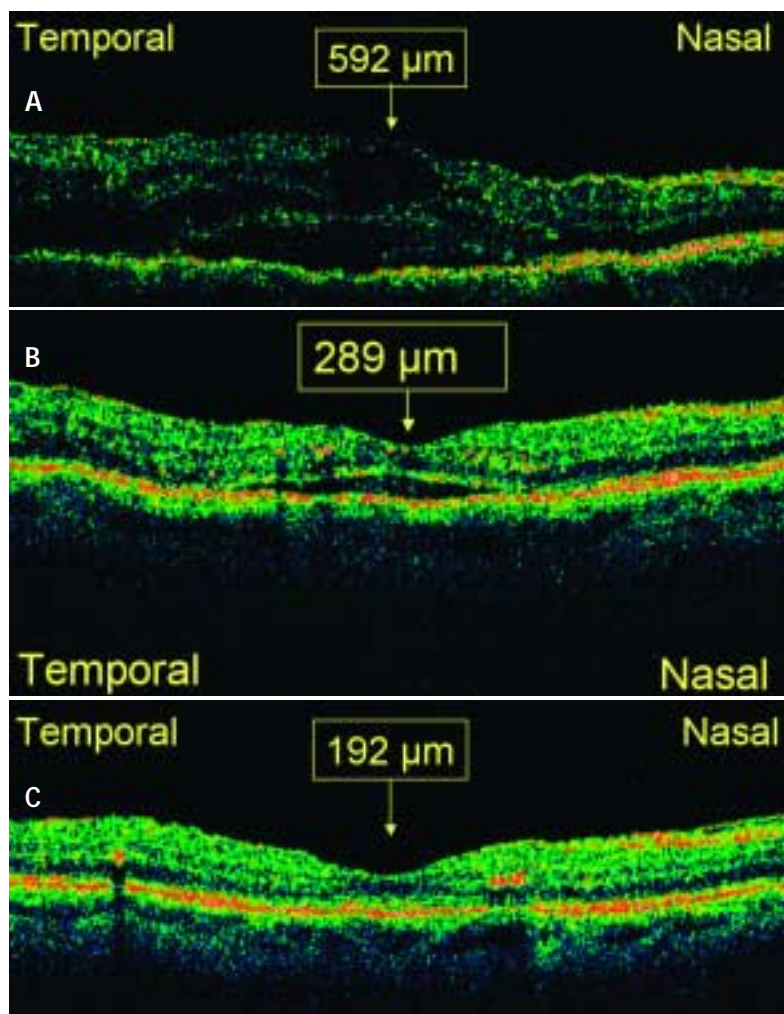


Figure 2. A cross-sectional image shows confluent cystoid edema and subretinal fluid (A). One month after treatment with triamcinolone acetate, cross-sectional imaging demonstrates clearance of CME and a normal foveal depression, but there is residual subretinal fluid (B). Three months later, the subretinal fluid has cleared (C).

One month after receiving intravitreal triamcinolone, the patient's UCVA improves to 20/40. The angiogram shows a decrease in the amount of leakage and resolution of many of the cystoid changes. OCT demonstrates the emergence of the foveal depression and a decrease in retinal thickness to approximately 289 μm . More importantly, the cross-sectional images show residual subretinal fluid under the fovea (Figure 2B), a finding that indicates that the patient's visual acuity may continue to improve. He is followed for 3 months, at which time the follow-up OCT shows a further decrease in foveal thickness to 192 μm and a normal foveal depression on the retinal map. The cross-sections reveal that

the subretinal fluid has cleared (Figure 2C), and the patient's visual acuity has improved to 20/25.

Case No. 4

A 70-year-old male achieves 20/20 UCVA OS after cataract surgery. He experiences distortion, metamorphopsia, and a decrease in UCVA to 20/30 over the subsequent 4 months. Angiography shows no leakage, but OCT reveals severe vitreomacular traction with elevation of the central fovea. The patient is at risk for developing a macular hole and requires close observation. His other eye has a UCVA of 20/20 and is asymptomatic. Interestingly, angiography of that eye is also unremarkable, but OCT imaging shows mild-to-moderate vitreomacular traction. This eye also warrants close observation until vitreomacular traction is relieved and either the fovea flattens or a macular hole develops.

SUMMARY

Preoperatively, OCT imaging can help cataract surgeons to rule out macular disease in patients whose degree of cataract is inconsistent with their visual acuity or in those who have risk factors (eg, diabetes or macular degeneration) for a suboptimal outcome after cataract surgery. When a patient experiences vision loss or no visual improvement after cataract surgery, OCT can assist the surgeon in diagnosing CME, diabetic macular edema, or abnormalities of the vitreomacular interface. This noninvasive

technology has the potential to become invaluable to the preoperative evaluation and postoperative management of cataract surgery patients. ■

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