Preoperative Assessment for Multifocal IOL Implantation

OCT of the posterior pole can improve outcomes.

BY ELISABETH PATSOURA, MD, MRCOPHTH

Cataract surgery has evolved into a refractive procedure that aims not only to improve vision but also to provide correction of ametropia and presbyopia. In most cases, patients achieve spectacle independence, and thus their quality of life is improved.

Multifocal apodized IOLs bring together a variety of optical and physical properties to provide vision over a wide range of distances. Diffractive steps are incorporated in the anterior lens surface, producing the diffractive add pattern.[1] Although apodization improves vision by eliminating unwanted photic phenomena, it cannot fully compensate for the inherent disadvantage of diffractive optical systems; that is, overall reduced light transmission directed to two foci, with the rest of the light being lost in higher diffractive orders.[1] Contrast sensitivity is also reduced, especially in dim illumination.

The main downsides of these lenses are the degradation of the quality and quantity of vision under certain conditions. This is particularly exacerbated when a coexisting ocular pathology is present, resulting in poor visual performance. Although anterior segment pathology can be readily identified on cursory slit-lamp examination, posterior pole abnormalities are sometimes difficult to detect in the presence of a cataractous lens. This is when optical coherence tomography (OCT) becomes a valuable diagnostic tool for the cataract surgeon.

PRECISION AND APPLICATIONS

OCT uses near-infrared illumination to produce high-quality cross-sectional images of the retina with an axial resolution of about 10 µm. Studies have shown that OCT can reliably detect fundus details even in the presence of a cataract up to grade 3 in the Lens Opacity Classification System.[2] Uncovering preoperatively any underlying macular pathology such as epiretinal membranes, vitreomacular traction, occult choroidal neovascular membrane, minimal cystoid macular edema, and even small retinal pigment epithelium detachments and drusen that are hardly visible on fundoscopy (Figures 1 through 3), can greatly influence the surgeon's decisions regarding how to manage a patient and choose the most appropriate IOL. In such cases, implantation of a multifocal IOL carries a risk and might predispose the patient to unpleasant postoperative surprises if significant pathology has been missed. In eyes in which an OCT cannot produce a reliable image due to a very dense cataract, a multifocal IOL should not be implanted.

It seems wise to advocate that, with the evolution of new multifocal toric designs that allow implantation of multifocal IOLs in eyes with significant corneal astigmatism and with the emergence of new treatments for anterior surface pathology, especially dry eye syndrome, macular pathology will be one of the few detrimental limiting factors for determining a patient's inclusion or exclusion for multifocal IOL implantation. Therefore, the importance of detecting macular pathology before cataract surgery cannot be overstressed.

TAKE-HOME MESSAGE

- OCT of the posterior pole should be integrated into the preoperative assessment when multifocal IOL implantation is considered.
- Better patient selection for multifocal IOLs and long-term results can be achieved with OCT.
- OCT can be reliable even in the presence of a mild to moderate cataract.

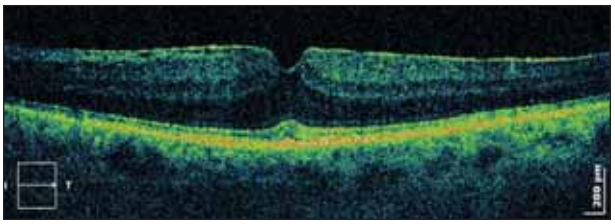

Figure 1. Epiretinal membrane distorting macular anatomy.

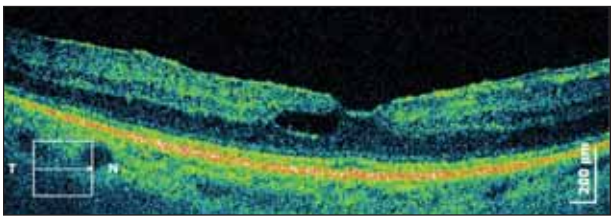

Figure 2. Epiretinal membrane with cystic intraretinal space.

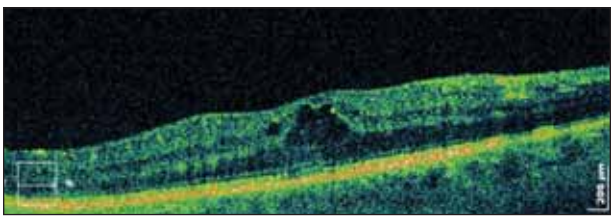

Figure 3. Early diabetic macular edema.

IMPROVING OUTCOMES WITH OCT

Based on our experience, subtle retinal conditions such as early epiretinal membranes and early age-related maculopathy changes are often overlooked preoperatively when a patient's evaluation is based only on dilated fundoscopy. It has been shown that even in early stages of maculopathy, when visual acuity is not yet affected, contrast sensitivity reduction is a consistent finding.[3] This is particularly important when a patient is to receive a multifocal IOL, which further reduces contrast.

In a study we carried out, which included 111 eyes of 111 patients, 51 eyes (group A) were preoperatively assessed without OCT and 60 eyes (group B) were preoperatively assessed with OCT. The most frequent macular pathologies detected postoperatively in multifocal IOL patients who underwent only dilated fundoscopy at preassessment were epiretinal membranes and early macular degeneration. The percentage of maculopathy in group A matched the prevalence of these conditions in the general postoperative cataract surgery population (64% of eyes had detectable macular changes). We thought that this was unacceptably high and that stricter criteria for patient selection had to be applied. By consistently using OCT when preoperatively assessing patients scheduled to have a multifocal IOL implanted (group B), we reduced the incidence of maculopathy to less than one-third of the incidence in

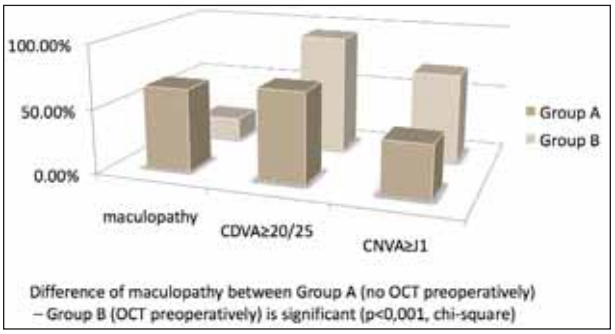

Figure 4. Postoperative results improved after inclusion of OCT in patient preassessment. CDVA = corrected distance visual acuity; CNVA = corrected near visual acuity.

group A (11.8%). The examination is fast, noninvasive, and easy to perform. With OCT, our overall postoperative results improved (Figure 4).[4]

Patients with no macular changes at the time of surgery are much less likely to develop or progress to severe maculopathies.[5] Although there is no consensus regarding the acceptable percentage of maculopathy in multifocal IOL implanted patients, it seems reasonable to advocate that it should compare with the overall incidence of maculopathies in a matched postoperative cataract surgery population.[6,7]

CHANGING PRACTICE PATTERNS

Using OCT as a preoperative assessment tool has changed our approach to choosing IOLs for patients. Applying more stringent criteria for patient selection ensures improvement in quality of service. With the continually increasing number of IOL designs available based on different optical properties, we can identify the best possible option for a patient who is not suitable to receive a multifocal IOL. In patients seeking spectacle independence, an accommodating IOL or a pseudophakic monovision solution may be a feasible alternative.

Cataract patients with a normal macula and strong family history of age-related macular degeneration (AMD) do not necessarily need to be discouraged from receiving a multifocal IOL. Nevertheless, they should be informed that an IOL exchange may be needed if maculopathy develops. Genetic testing may be routinely performed in these patients in the future, but such testing at this time cannot predict the course of the disease. In our experience, use of a multifocal IOL as a low vision aid has produced good results, but this is not standard practice.[8]

Consultations for patients with diabetes should follow similar lines. Even minimal diabetic maculopathy changes can be aggravated after cataract surgery, or new lesions can develop in a previously unaffected eye. Patients at risk for developing maculopathy can also be offered a multifocal add-on IOL that can be removed if needed.

Most studies to date looking at patient satisfaction with multifocal IOLs have identified unacceptable photic phenomena as the main reason for explantation.[9] However, these studies have had relatively short follow-up. As studies with longer follow-up (10 years and more) are now being completed, it is likely that development or progression of retinal pathology may become another important cause for patient dissatisfaction and subsequent multifocal IOL explantation.

We have had to explant multifocal IOLs from 2 eyes due to progression of dry AMD. Patients may adapt to the way they see, but this does not equal good visual performance. We need to look further ahead and continue monitoring eyes implanted with multifocal IOLs.

We still encounter the occasional patient who, despite macular pathology, achieves a satisfactory level of vision, but this is definitely not the case for demanding patients who seek high quality of vision.

CONCLUSION

OCT has to become a mandatory diagnostic tool for every patient preoperatively assessed for multifocal IOL implantation. OCT not only safeguards the surgeon's choice of the best IOL but also the patient's best interests. Premium IOLs have been developed to meet premium patients' expectations. Patients willing to pay for multifocal IOLs must be assured of satisfactory outcomes. It is therefore considered malpractice if a comprehensive preoperative examination does not take place before surgery. ■

Elisabeth Patsoura, MD, MRCOphth, is an eye surgeon at Ophthalmos Research & Therapeutic Institute, Athens, Greece. Dr. Patsoura states that she has no financial interest in the material presented in this article. She may be reached at tel: +30 210 894 0902; e-mail: ophthalmos@ophthalmos.gr.

1. Davidson JA, Simpson MJ. History and development of the apodized diffractive intraocular lens. *J Cataract Refract Surg.* 2006;32(5):849-858.
2. Van Velthoven MEJ, van der Linden MH, de Smet MD, et al. Influence of cataract on optical coherence tomography image quality and retinal thickness. *Br J Ophthalmol.* 2006;90:1259-1262.
3. Qui F, Leaf SJ. Functional deficits in early stage age related maculopathy. *Clin Exp Optom.* 2009;92(2):90-98.
4. Patsoura E, Diamantopoulou K, Neireiter B. Georgaras S. Optical coherence tomograhy as a diagnostic tool in preoperative assessment of cataract patients eligible for a multifocal intraocular lens implantation. Paper presented at: the European Society of Cataract and Refractive Surgeons Annual Meeting; September 2011; Vienna.
5. Klein R, Klein BE, Jensen SC, et al. The five-year incidence and progression of age related maculopathy. The Beaver Dam Eye Study. *Ophthalmology.* 1997;104(1)7-21.
6. Fraser-Bell S, Guzowski M, Rochtchina E. et al. Five year incidence and progression of epiretinal membranes: the Blue Mountains Eye Study. *Ophthalmology.* 2003;110(1):34-40.
7. Mitchell P, Wang JJ, Foran S, Smith W. Five year incidence of age related maculopathy lesions: the Blue Mountains Eye Study. *Ophthalmology.* 2002;109(6):1092-1097.
8. Georgaras S, Weidermann P, Metaxaki I. Restor as a low vision aid. Paper presented at: the 20th HSIOIRS International Congress; 2006; Athens, Greece.
9. Woodward MA, Randleman JB, Stulting RD. Dissatisfaction after multifocal intraocular lens implantation. *J Cataract Rerfact Surg.* 2009;35(6):992-997.