IOL SELECTION AND GLAUCOMA


The effects of certain lenses on the disease and patients' visual outcomes.

BY LUKE BARNARD, MD, AND CHRISTOPHER TENG, MD, MBA

THE EFFECT OF BLUE-LIGHT FILTERING INTRAOCULAR LENSES ON THE DEVELOPMENT AND PROGRESSION OF GLAUCOMA

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ABSTRACT SUMMARY

This retrospective cohort study assessed 11,208 patients' (11,028 eyes) overall risk of developing glaucoma or requiring a glaucoma procedure after undergoing uneventful cataract surgery with the implantation of a blue light–filtering (BLF) or non-BLF IOL at a Finnish hospital between the years of 2007 and 2018. BLF IOLs (AcrySof model SN60WF, Alcon) were implanted in 5,188 eyes (47%), and non-BLF IOLs (Tecnis models ZA9003 and ZCB00, Johnson & Johnson Vision) were placed in 5,840 eyes (53%).

The main outcomes assessed were glaucoma-free survival and glaucoma procedure–free survival. Patients diagnosed with glaucoma before or within 12 months of cataract surgery were excluded from the primary outcome and analyzed separately for disease progression as a secondary outcome.

Glaucoma-free survival rates demonstrated an advantage to the BLF IOL (P = .036). In a Cox regression analysis controlling for age and sex, the use of a BLF IOL was associated with a lower risk of glaucoma development (hazard ratio: 0.778; 95% CI: 0.621–0.975). Glaucoma procedure–free survival analysis found an advantage to the BLF IOL (hazard ratio: 0.616; 95% CI: 0.406–0.935). Among patients with preexisting glaucoma, no significant differences were observed for any outcome.

STUDY IN BRIEF

- A large, retrospective cohort study evaluated patients' glaucoma-free and glaucoma procedure–free survival rates after undergoing uneventful cataract surgery with the implantation of a blue light–filtering (BLF) or non-BLF IOL. Compared to patients who received a non-BLF lens, those who received a BLF IOL were 22% less likely to develop glaucoma and 38% less likely to require a glaucoma procedure. No significant differences were observed for any outcome, however, among patients who had preexisting glaucoma or were diagnosed with the disease within 12 months of cataract surgery.

WHY IT MATTERS | The study indicates that oxidative damage may play a role in the development of glaucoma. It also suggests that BLF IOLs may have a protective effect in patients who currently do not have glaucoma but are at increased risk of developing the disease.

DISCUSSION

What role may blue light play in the development of glaucoma?

An experimental study published in 2006 indicated that short-wavelength light may cause reactive oxygen species through interactions with retinal ganglion cell (RGC) mitochondria, inducing RGC death.[2] Cataracts and BLF IOLs may offer protection by blocking certain wavelengths of light, thereby reducing the formation of these oxidative species, oxidative damage to RGCs, and subsequent glaucomatous changes.

Why did BLF IOLs not reduce progression in the eyes with preexisting disease?

A diagnosis of glaucoma typically occurs after an eye has sustained structural or functional damage from the disease. BLF IOLs may have a protective effect only before such damage occurs.

What are the potential downsides of implanting a BLF IOL?

BLF IOLs have been associated with decreased scotopic vision, impaired night driving, and possible disruptions to circadian rhythm.[3,4] Multiple studies have evaluated the effect of BLF IOLs on various outcomes, but the results have been inconclusive or conflicting, including both an improvement and no improvement in contrast sensitivity.[4,5] Kitnarong et al found no significant difference in contrast sensitivity among patients with mild to moderate glaucoma who received BLF IOLs compared to those who received standard UV-blocking IOLs.[6]

What are the practical implications of the study?

Surgeons consider many factors when determining which IOL would be best for a given patient. The study by Hecht et al[1] highlights the importance of taking an individual's glaucoma risk factors and glaucoma status into account when choosing IOLs.

COMPARISON OF THE VISUAL OUTCOMES OF ENHANCED AND STANDARD MONOFOCAL INTRAOCULAR LENS IMPLANTATIONS IN EYES WITH EARLY GLAUCOMA

Nam JW, Lee JH, Zhang H, Sung MS, Park SW[7]

Industry support: None

ABSTRACT SUMMARY

A prospective, nonrandomized, observational study compared the safety and efficacy of implanting a standard versus an enhanced monofocal IOL in patients with concurrent cataracts and medically controlled, early open-angle glaucoma (OAG). A single surgeon implanted a Tecnis IOL (model ZCB00, Johnson & Johnson Vision) in 38 eyes and a Tecnis Eyhance IOL (model ICB00, Johnson & Johnson Vision) in 34 eyes.

The uncorrected intermediate visual acuity of patients who received the enhanced monofocal IOL was superior to that of individuals who received the standard monofocal IOL (P = .003). No significant difference in uncorrected distance visual acuity, corrected distance visual acuity, or uncorrected near visual acuity was observed between groups. The postoperative defocus curves were more consistent in the enhanced monofocal IOL group, especially at the intermediate distances of -1.00 D (P = .042) and -1.50 D (P = .026).

Patient surveys revealed no differences in postoperative photic phenomena or satisfaction with their near or distance vision between groups. At intermediate distance, however, the degree of satisfaction was higher (P = .019) among patients who received the enhanced monofocal IOL. Their level of spectacle dependence was also lower (P = .004).

Contrast sensitivity and visual field parameters did not differ significantly between groups after surgery.

DISCUSSION

What constitutes an enhanced monofocal IOL?

The anterior surface of these lenses has a higher-order aspheric shape that results in a continuous increase in power without any diffractive surface changes.[7] This category of lenses increases depth of focus by less than 0.50 D, which is why they retain the monofocal label. The IOLs can increase patients' intermediate visual acuity without compromising their distance visual acuity.[8]

Should clinicians recommend an enhanced monofocal IOL to patients with early OAG?

The study found that implanting an enhanced monofocal IOL in individuals with early OAG improved certain visual outcomes and patient satisfaction levels without negatively affecting visual field parameters. It should be noted that the follow-up period was only 3 months. Moreover, the study did not compare the safety and efficacy of an enhanced monofocal IOL with those of multifocal or enhanced depth of focus lenses, neither of which is typically recommended to patients with glaucoma because of the risk of contrast sensitivity loss.[9]

Although the study by Nam et al[7] did not evaluate the full range of available lens options, it suggests that enhanced monofocal IOLs can offer benefits in terms of visual outcomes for patients who have early OAG. ■

STUDY IN BRIEF

- A prospective, nonrandomized, observational study compared the safety and efficacy of implanting a standard versus an enhanced monofocal IOL in patients with concurrent cataracts and early open-angle glaucoma. Individuals who received an enhanced monofocal IOL achieved better intermediate visual acuity and reported greater satisfaction with their visual outcomes than those who received a standard monofocal IOL. No significant differences in photic phenomena, visual fields, or contrast sensitivity were found between groups.

WHY IT MATTERS | Multifocal and extended depth of focus IOLs typically are not recommended for patients with glaucoma because the lenses can reduce contrast sensitivity. Enhanced monofocal lenses may safely offer patients with early disease visual outcomes that are superior to what a standard monofocal IOL can provide.

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