Effective presbyopia correction using an EDoF IOL in a patient with AMD

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CASE HISTORY

A 68-year-old female patient presented on referral for cataract surgery. She stated that she actively participates in sports and would like to be able to see well without glasses.

A refraction performed in 1998 showed she had +0.5 D of sphere in both eyes. In 2018, her refraction was -0.50 -2.25 x 10° ($Vcc_{Distance}$=0,5) add +2.50 (Vcc_{Near}=0,5) OD; +2,00 -1.00 x 127° ($Vcc_{Distance}$=0,8) add +2.50 (Vcc_{Near} =0,8) OS. The prescription in her glasses was: +1.25 -0.75 x 10° Vcc= 0.2 OD; +1.50 -1.25 x 175° Vcc= 0.63. Near: +3.75 -0.50 x 8° OD; +3.25 -0.50 x 156° OS.

In addition to refraction and visual acuity, the patient underwent a comprehensive ophthalmic examination that included Scheimpflug camera imaging (Pentacam HD, Oculus), fundus imaging with a non-mydriatic color fundus camera (VISUCAM PRO NM, Carl Zeiss Meditec), and optical biometry with swept-source OCT (IOLMaster 700, Carl Zeiss Meditec). Multiple macular drusen were present in both eyes and were worse in the right eye. The patient had no vision defects on Amsler grid testing and no other remarkable findings. Based on this, together with the patient the decision was made, to not implant a trifocal IOL but and Extended Depth of Focus (EDoF) IOL (ZEISS AT LARA) instead.

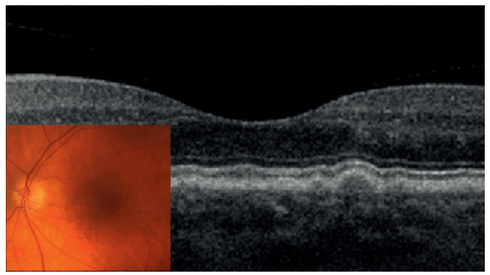

Fig. 1 Fundus imaging with VISUCAM PRO NM show multiple macular drusen.

Biometric data and IOL power calculations obtained using the IOLMaster 700 are listed below.
OD: K1 42.62 D/7.79 mm; K2 42.89 D/7.74 mm; cylinder -0.30D @ 175°; anterior chamber depth 3.31 mm; axial length 23.44 mm; IOL power for emmetropia 21.50 D
OS: K1 43.34 D/7.66 mm; K2 43.51 D/7.63 mm; cylinder -0.19 D @ 123°; anterior chamber depth 3.29 mm; axial length 23.35 D; IOL power for emmetropia 21.00;

SURGERY

The patient underwent bilateral implantation with the extended depth of focus (EDoF) AT LARA 829MP IOLs (Carl Zeiss Meditec) using a micromonovision approach. The right eye was operated first with implantation of a 21.5 D lens to achieve a slightly myopic target of -0.47 D and a 20.5 D IOL was implanted OS targeting near emmetropia (calculated -0.17 D).

The surgery was performed through a 2.2 mm incision with conventional phacoemulsification. Preoperative data acquired with the IOLMaster 700 were transferred to the OPMI LUMERA 700 microscope (Carl Zeiss Meditec) and used with the CALLISTO eye ASSISTANCE markerless system (Carl Zeiss Meditec) to guide accurate centration and sizing of the capsulorhexis. Careful attention was directed to meticulous polishing of the anterior capsule to limit fibrosis and opacification that could affect the refractive and functional outcomes.

OUTCOMES

Images taken with the CALLISTO eye at follow-up 1 week after surgery show that the IOLs are well-centred. At 6 weeks after surgery, binocular uncorrected VA (decimal) was 0.9 at distance and 0.8 at both intermediate and near. Binocular corrected DVA was 1.0.

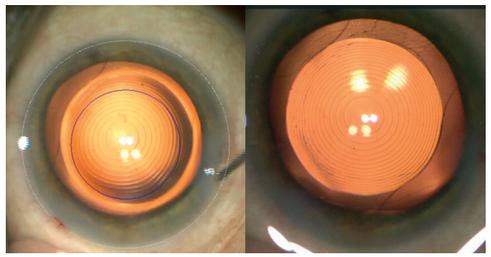

Fig 2: Images taken with the CALLISTO eye at follow-up 1 week after surgery.

The patient was asked to give feedback about the implants in a patient questionnaire, taken 8 weeks after surgery. She completed the questionnaire without requiring glasses to read or write. The report proves a very high patient satisfaction and states that she does not need glasses for distance and intermediate and only seldomly for near vision.

DISCUSSION

The trifocal AT LISA tri 839MP and AT LISA tri toric 939MP IOLs are my IOLs of choice for patients interested in achieving spectacle independence after cataract surgery. My clinical experience with these IOLs over the last 6 to 7 years is consistent with results from published studies showing that they provide good image quality with a full range of functional uncorrected vision.[1-3]

Nevertheless, reduced contrast sensitivity and potential for nighttime dysphotopsias remain inherent issues with all diffractive multifocal IOLs.[4] Therefore, patients who have ocular conditions that are associated with reduced contrast sensitivity, such as glaucoma or age-related macular degeneration, as well as patients who may be intolerant of nighttime dysphotopsias, should not be implanted with a trifocal IOL.

Compared with multifocal IOLs, the AT LARA EDoF IOLs have less effect on contrast sensitivity and cause less problems with nighttime dysphotopsias.[4] Designed with spherical and chromatic aberration correction and smooth phase zones, the AT LARA IOLs deliver excellent distance and intermediate vision, optimise contrast sensitivity, and minimise light scattering and the risk for debilitating nighttime visual disturbances. Having a wide range of focus, the AT LARA IOLs can also provide patients with functional near vision. Use of a micromonovision approach, which targets the dominant eye for distance and the nondominant eye for reading, can meet the needs of patients wanting better near vision.

The AT LARA is also available in a toric version, and that is important considering that approximately one-third of cataract patients may need astigmatism correction to achieve good uncorrected vision with presbyopia-correcting IOL technology. Intraoperative image guidance with the CALLISTO eye improves the accuracy of toric IOL alignment compared with manual marking techniques.[5] Even in non-toric cases, the CALLISTO eye has value for guiding capsulorhexis and accurate IOL centration that is important for optimal vision.

The patient in this case was eager to see well without glasses after her cataract surgery. Bilateral implantation of a monofocal IOL with a monovision approach is another strategy for providing patients with reduced spectacle dependence after cataract surgery. This option can result in satisfactory outcomes and avoid the issues of reduced contrast sensitivity and dysphotopsias accompanying multifocal IOL technology. However, compared with bilateral implantation of the AT LARA EDoF IOLs using a micromonovision approach, it is more likely to result in poorer uncorrected distance VA and reduced depth perception.

All presbyopia-correcting IOLs have some limitations. Achieving success and patient satisfaction with use of these technologies depends on performing a comprehensive diagnostic examination preoperatively to evaluate ocular health and determine whether patients are appropriate candidates for implantation. With its swept-source OCT, the IOLMaster 700 may detect macular pathologies.[6] The VISUCAMPRO NM is a user- and patient-friendly device for definitive diagnosis of retinal disease and was valuable in this case for confirming the presence of macular drusen.

A careful history is also needed to understand each patient's vision needs, and detailed counseling is mandatory so that patients understand the pros and cons of the presbyopia-correcting surgical options and have appropriate outcomes expectations. When discussing presbyopia-correcting implants, I avoid referring to them as "premium IOLs". Instead I present these lenses as advanced technologies and describe their additional functions because I feel this approach helps patients understand and accept the extra fees that are charged for presbyopia-correcting IOL surgery. Patients who choose advanced technology IOLs are also asked to sign a waiver form acknowledging that they were informed of the risks and benefits.

CONCLUSION

Because I have accumulated several years of excellent experience and results with the AT LISA tri family of IOLs, they remain my first choice for presbyopia-correcting IOL surgery. The AT LARA IOLs are a newer addition to our presbyopia-correcting IOL armamentarium and have also been associated with excellent outcomes in my practice. From my perspective, the AT LARA IOLs are a perfect complement to the family of AT LISA tri IOLs and an important option that broadens the population of patients who can be offered the benefit of reduced spectacle dependence after cataract surgery.

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