MICS With Implantation of a Trifocal Diffractive IOL

Six strategies that will help to satisfy your patients.

BY JÉRÔME C. VRYGHEM, MD

Modern phaco technology allows us to perform microincision cataract surgery (MICS) under safe conditions. As I described in a previous article in *CRST Europe* (*Small-Incision Bimanual Phaco Chop*; April 2008; pages 57-58), my preferred MICS technique is bimanual phaco chop through a 1.4-mm temporal incision. One of the biggest benefits I have noticed is that there is no surgically induced astigmatism as a result of the microincision.

SIX PEARLS

I routinely perform MICS with bimanual chop, and a recent case presentation can be viewed at http://eyetube.net/?v=savif. Below I list six key characteristics of my technique and describe the advantages of each.

No. 1: Incisions. I create the main incision (1.4 mm) temporally and the sideport (1 mm) 135° from the main incision. Placing the incisions in this manner provides perfect control of eye and allows me access to all areas of the anterior chamber.

No. 2: Sleeveless phaco tip. I prefer sleeveless surgery with the WhiteStar Signature system (Abbott Medical Optics Inc., Santa Ana, California) because it allows use of minimal incision sizes and ensures heat control at the phaco tip. This strategy avoids corneal burns.

No. 3: Instruments and incision size must be complementary. Perfect match between instruments and incision size is ideal to maintain anterior chamber stability.

No. 4: Phaco chop. I prefer this phacoemulsification

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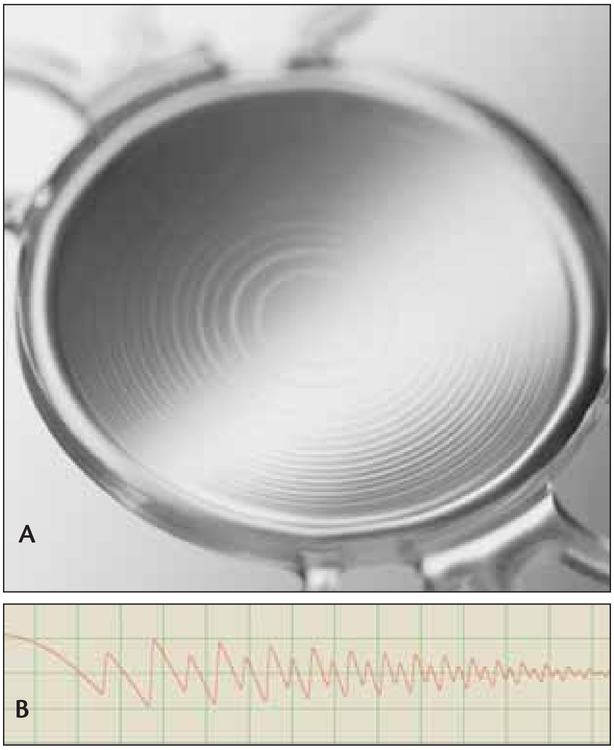

Figure 1. (A) The FineVision IOL. (B) The apodized profile of the FineVision IOL (over a radius).

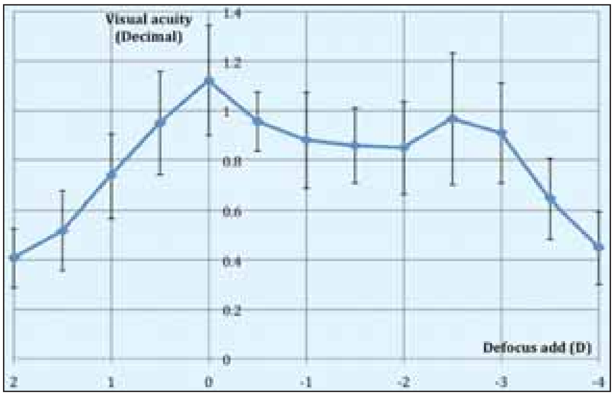

Figure 2. Binocular best distance-corrected defocus curve with the FineVision IOL.

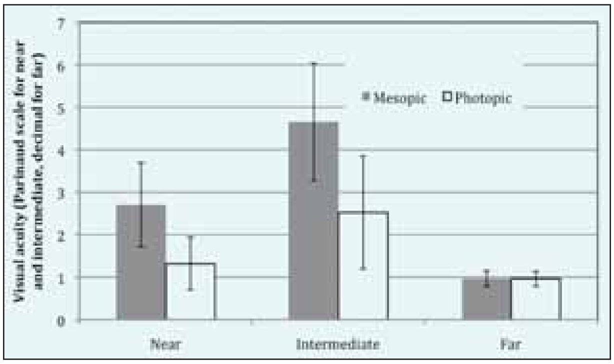

Figure 3. Distance BCVA in photopic and mesopic conditions for near, intermediate, and far vision with the FineVision IOL. The far vision is scored as Snellen decimal. The near and intermediate visual acuities are in Parinaud scales.

technique because it shortens procedure times and minimizes ultrasound dispersion in the anterior chamber.

No. 5: High flow. Using an irrigating chopper with a high flow rate allows me to avoid increasing the bottle height. I have designed the Vryghem Chopper (A.R.C. Laser GmbH, Nuremberg, Germany), an irrigating chopper with an ultrathin titanium wall (50 µm), a bigger lumen, and a Nagahara tip. It produces a flow of 80 mL/min.

No. 6: IOL insertion. Unfortunately, the main incision must be enlarged to 1.8 or 1.9 mm to accommodate IOL insertion. Forcing implantation through a tight incision increases the risk of damaging the IOL's optic or haptics. For implantation, the cartridge is docked into the incision; the tip does not penetrate into the anterior chamber.

MICS LENS DESIGNS

Good MICS IOL designs that promote capsular bag stability include a normal-sized, 6-mm optic. I prefer hydrophilic acrylic IOLs, and the two monofocal IOLs I use with frequency are the Acri.Smart 36A (Carl Zeiss Meditec, Jena, Germany), a plate-haptic IOL, and the MicroAY (PhysIOL, Liége, Belgium), which has four rounded haptics. Both lenses provide excellent and stable results. Both IOLs have 25% water content, making them highly foldable and capable of insertion through incisions of 1.8 mm.

TAKE-HOME MESSAGE

- Bimanual phaco chop can be performed through a 1.4-mm temporal incision.
- One benefit of small incision sizes is that there is little or no surgically induced astigmatism.
- The FineVision trifocal IOL provides good near, intermediate, and distance vision with implantation through an astigmatically neutral incision.

MULTIFOCAL MICS IOLs

When I implant a multifocal IOL, my preferences for the past 2 years have been for the AT.LISA (Carl Zeiss Meditec), the MPlus (OcuLentis BV, Eerbeek, Netherlands), and the FineVision (PhysIOL; Figure 1A). The AT.LISA, a diffractive IOL with bifocal characteristics, and the MPlus, a refractive bifocal IOL, provide patients with good distance vision; however, reading ability with these lenses is limited in space. Reading performance with the AT.LISA is slightly better than with the MPlus, but patients must read at a close distance. This is not ideal for younger or more active patients or for those whose daily work involves computers; in these circumstances, the MPlus IOL is preferred.

The FineVision IOL, a diffractive trifocal lens, provides good reading abilities at both intermediate and near distances. It is built on the same platform as the MicroAY lens. It is a biconvex, aspheric hydrophilic acrylic IOL with 25% water content. The lens has four rounded haptics, and the 6.15-mm optic includes ultraviolet and blue-light blockers. The lens' trifocal diffractive pattern is achieved by combining two bifocal patterns with two different step heights over the whole surface of the optic; one provides a 1.75 D add and the other a 3.50 D add. Each diffractive pattern has its own diffractive grating; the second order of the 1.75 D add diffractive grating reinforces the first order of the 3.50 D add diffractive grating, providing improvement in intermediate vision and maintaining far and near vision. This IOL is apodized, with the step height decreasing from the center toward the periphery (Figure 1B). The diffractive pattern is pupil dependent, allocating more energy to far vision when the pupil is enlarged under dim light conditions.

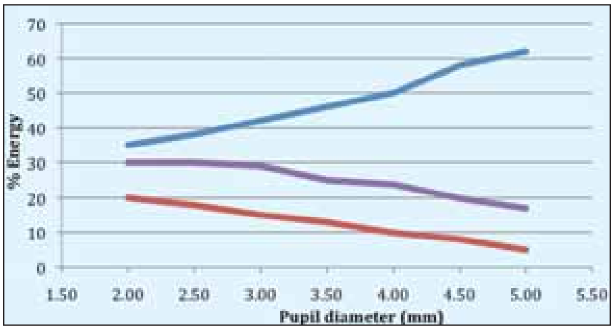

Figure 4. Pupil dependence of the FineVision IOL. The percentage of energy allocated to far vision correlates with the pupil diameter.

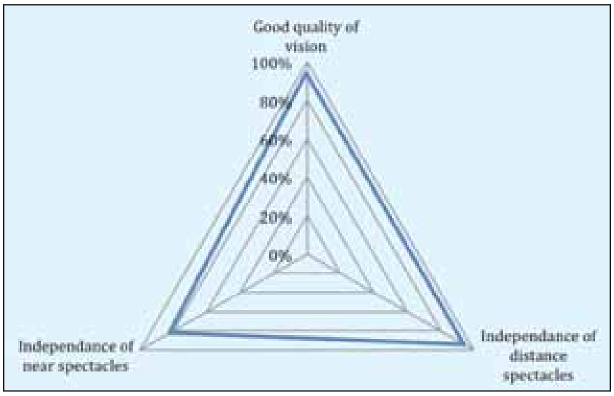

Figure 5. Schematic of the percentage of eyes achieving good subjective vision and spectacle independence for far and near vision with the FineVision IOL.

EARLY OUTCOMES

I have implanted the FineVision IOL in 150 eyes, of which 32 eyes of 16 patients with 1.00 D of preoperative astigmatism or less have completed follow-up. The mean postoperative spherical equivalent in this population is 0.03 ±0.30 D, and 96% of eyes are within ±0.50 D of intended correction.

Distance vision. The mean postoperative monocular UCVA in these patients is 0.90 ±0.20 (Snellen decimal), improving to 1.13 ±0.24 with binocular measurement. UCVA was 0.5 or better in all eyes. Monocular UCVA was 0.8 or better in 78% of eyes (due to dry eye) and in 100% of eyes when tested binocularly. Postoperative distance BCVA is 0.96 ±0.17, and binocular distance BCVA was similar to binocular UCVA (1.14 ±0.23). All patients had 0.8 or better BCVA.

Intermediate vision. Intermediate vision was assessed with an optotype for near vision positioned at 60 cm. Mean monocular intermediate UCVA was Parinaud 2.46 ±1.09. (Parinaud 2 is equivalent to J1.) A total of 96.9% of eyes were Parinaud 4 or better, and 84.3% were Parinaud 3 or better. Mean binocular intermediate UCVA was Parinaud 1.69 ±0.53, and all patients saw Parinaud 3 or better.

Near vision. Mean monocular near UCVA was Parinaud 1.34 ±0.50. All patients saw Parinaud 3 or better, and 93.75% of patients saw Parinaud 2 or better. The binocular near UCVA improved to Parinaud 1.08 ±0.16, and saw 100% of patients seeing Parinaud 2.

Defocus curve. The best distance-corrected binocular defocus curve obtained with these 16 patients showed that objective visual acuity was always greater than 0.85 between 0.00 and -3.00 D add (Figure 2). This indicates that the FineVision IOL provides a continuum of good visual acuity between 33 cm and infinity. A greater range of intermediate vision is achieved with the FineVision IOL compared with the defocus curve obtained with a bifocal IOL.

Mesopic vision. There was no difference in the photopic and mesopic distance BCVAs at far (Figure 3); however, a significant decrease was seen between photopic and mesopic conditions for intermediate and near vision (t-test small sample, $P<.05$). This demonstrates the efficiency of the apodization, which decreases the amount of energy allocated for intermediate and near vision to maintain distance vision in dim conditions. The FineVision IOL is apodized over its whole surface (Figure 1A). This means that the three focal points are present no matter the pupil size, but the

Micro-Implantation Cataract Suite for the WhiteStar Signature Platform

BY CALLAN NAVITSKY, ASSISTANT EDITOR

Abbott Medical Optics Inc. (Santa Ana, California) recently announced the global launch of its Micro-Implantation Cataract Suite, designed to improve the outcomes and safety of cataract procedures. According to the company, the suite enables surgeons to perform an entire microsurgical procedure, provide a safer intraoperative environment, and promote faster healing and visual recovery.

The Micro-Implantation Cataract Suite consists of five separate components, each designed to maximize the benefits of microincision cataract surgery (MICS). The suite features the company's new Unfolder Platinum 1 Series Implantation System, which enables microimplantation of the Tecnis 1-piece IOL. Also included are the Healon family of ophthalmic visosurgical devices, Abbott's WhiteStar Signature Phacoemulsification System, and a set of surgical accessories designed specifically for use in MICS procedures.

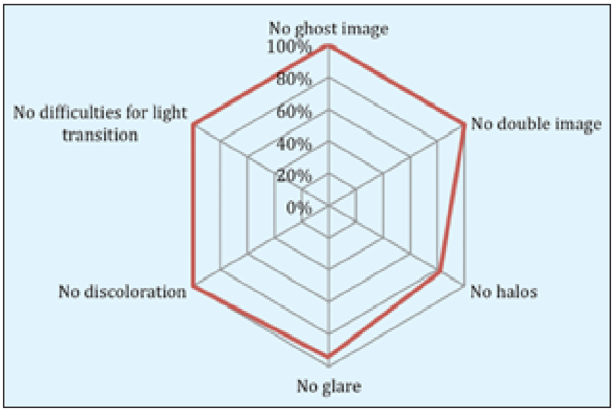

Figure 6. Schematic of the percentage of eyes experiencing no side effects with the FineVision IOL.

energy contribution from the near and intermediate focal points is reduced in dim light conditions. The energy allocation of the IOL is depicted in Figure 4.

PATIENT EVALUATION

Patient satisfaction (Figure 5) with the FineVision IOL was impressive, with 76% of patients stating that they would undergo implantation with the same IOL again; the remaining patients did not answer because they said they could not compare their vision with and without the lens. Nearly all patients (82%) do not use spectacles for near vision, 18% use spectacles only for small characters, and 6% use spectacles for distance reading. A total of 94% of patients responded that the lens provides good vision, with only one patient dissatisfied due to dry eye.

Minor complaints were due to optical side effects of the trifocal IOL (Figure 6), with 9% reporting halos. Another 9% reported seeing halos when prompted.

CONCLUSION

The FineVision IOL is my preferred multifocal MICS IOL. It provides good distance, intermediate, and near visual acuities without inducing astigmatism. The apodization of this lens favors distance vision at night. The trifocal diffractive design of the IOL adds intermediate vision with no significant decrease in near and distance vision as compared with currently available bifocal IOLs. To implant this IOL, I prefer bimanual phaco chop through a 1.4-mm incision. ■

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