The move toward microincision cataract surgery has been fueled by a number of potential advantages, including the possibility of reducing or even eliminating surgically induced astigmatism (SIA). Reducing SIA allows surgeons to more accurately predict the refractive outcome of the cataract procedure and provide optimal postoperative quality of vision, which patients have come to expect. With the U.S. introduction of the Akreos AO Micro Incision Lens (model MI60L, Bausch + Lomb), surgeons are equipped to achieve these goals.

The Akreos MICS lens, which can be implanted through an unenlarged 1.8-mm incision, is the latest addition to Bausch + Lomb’s MICS Platform, which includes all of the tools necessary for performing true sub-2mm surgery — Stellaris phaco machine, Storz instruments, Amvisc Plus OVD, Viscoject Lens Injection System and the Akreos MICS lens.

Minimizing Induced Astigmatism

Boris Malyugin, MD, PhD, chief of Cataract and Implant Surgery and deputy director general at the S. Fyodorov Eye Microsurgery Complex State Institution in Moscow, has implanted more than 500 Akreos MICS lenses since the IOL was approved in Europe. He recently compared outcomes of 1.8-mm coaxial MICS with outcomes of 2.8-mm small incision cataract surgery (SICS). SIA was among the parameters he evaluated. Patients in the study had similar preoperative best-corrected visual acuity and grade of lens opacity. All procedures utilized a clear corneal incision and the same surgical settings on the Stellaris phacoemulsification system. Eyes in the C-MICS group were implanted with the Akreos MICS lens, and eyes in the SICS group were implanted with the Akreos AO lens (Bausch + Lomb).

According to Dr. Malyugin, the C-MICS procedure was associated with improvement in BCVA beginning at 1 day post-op, which was much earlier than the BCVA improvement associated with SICS. Furthermore, at 1 month post-op, SIA in the C-MICS eyes averaged 0.1 ± 0.15D, and SIA in the SICS eyes averaged 0.5 ± 0.31D.

Results of other studies also have indicated that 1.8-mm incisions may be astigmatically neutral for the cornea. For example, Elkady and colleagues performed MICS through a 1.6- to 1.8-mm clear corneal incision placed on the axis of the positive corneal meridian in 25 eyes. They found no statistically significant difference between levels of corneal astigmatism before and 3 months after surgery (-0.80 ± 0.76D vs. -0.63 ± 0.62D). They also found no significant difference in total Seidel aberration RMS values before and after the procedures (2.15 ± 2.51 µm vs. 1.96 ± 2.01 µm).

In a nonrandomized prospective consecutive series, Wilczynski and colleagues used three mathematical methods to calculate SIA following two different surgical techniques, 1.8-mm coaxial MICS (58 eyes) and 1.7-mm bimanual MICS (50 eyes). Patients in the C-MICS group received Akreos MICS lenses; patients in the B-MICS group received Acri.Smart MICS foldable IOLs (Carl Zeiss Meditec). The investigators reported the amount of astigmatism induced by both techniques was very small and not significantly different.

By vector analysis, mean SIA was 0.42 ± 0.29D for C-MICS and 0.50 ± 0.24D for B-MICS. By vector decomposition, mean SIA was 0.23 ± 0.29D for C-MICS and 0.23 ± 0.22D for B-MICS. By the Naeser method, mean SIA was 0.05 ± 0.44D for C-MICS and -0.04 ± 0.42D for B-MICS.

Dr. Malyugin summarized what has been learned to date about SIA and MICS. “We know the cornea is responsible for most of the aberrations in the eye, and that patient satisfaction hinges on achieving a high-quality retinal image. Incisions as small as 1.8-mm prevent induction of aberrations by stabilizing corneal topography, and with C-MICS, the optical quality of the cornea does not degrade.”

John Hunkeler, MD, founder and medical director of Hunkeler Eye Institute in Overland Park, Kan., was among the first U.S. surgeons to implant the Akreos MICS lens. “Based on my experience, implanting this lens through the 1.8-mm incision seems to have little to no effect on corneal astigmatism in the short term," he said.
Support for the C-MICS Approach

Drs. Hunkeler and Malyugin use the Akreos MICS lens as their primary monofocal implant and prefer a C-MICS rather than B-MICS technique. Dr. Hunkeler uses a trapezoidal blade to create his primary incision at 1.8 mm internally and 2.0 mm externally. "Paired with the matching sized instrumentation, the incision is just right, tight but not so tight that you can’t get into the eye," he said. Dr. Hunkeler said that C-MICS allows cataract surgeons to operate in a more closed system. "Our vitreoretinal colleagues have shown us the benefits of a closed system," he said. "Less fluid is needed, less leakage of fluid from the eye occurs, and the internal structures remain in their normal state with relatively normal pressure."

Dr. Malyugin also uses a trapezoidal blade to create his main incision, which is 1.8 mm externally and 1.6 mm internally. "The slightly wider outer aspect of the wound enhances maneuverability of the Stellaris phaco handpiece and also provides sufficient inflow of the irrigation fluid into the anterior chamber, making it very stable throughout the procedure," he said. "With C-MICS, it is very easy and natural to create square wounds, which we know from Paul Ernest’s cadaver eye studies are the most secure.1 Incision angle is also important. The sharper the angle of the incision, the thinner the cornea on first postoperative day. We have less trauma and quicker recovery and refractive stabilization. With 1.8-mm C-MICS, the recovery of the corneal thickness to its initial state is very fast." (Figure 1)

Transitioning from standard surgical technique to C-MICS should not pose a problem for surgeons, according to Drs. Hunkeler and Malyugin. However, the smaller incision makes it difficult to open conventional forceps for capsulorhexis. Therefore, purchasing a new microinstrument or learning to do a cystotome capsulotomy is required. Also, there is a small learning curve for becoming acquainted with the wound-assisted technique for Akreos MICS lens implantation. Dr. Malyugin said. "The eye should not be soft, and the chamber and capsular bag should be completely filled with OVD," he recommended. "If the outer aspect of the wound is located close to the limbal area and the point of conjunctiva fixation, the surgeon should watch carefully because conjunctiva can get into the wound and make implantation difficult. If this happens, increased resistance of the plunger and movement of conjunctiva will be felt. After 5 to 10 cases, surgeons should be very comfortable with the technique."

Dr. Hunkeler facilitates the wound-assisted technique by placing his paracentesis less than one clock hour away from his primary incision. "This provides good wound control," he said. "I pull a little with a hook at the paracentesis and gently push with the injector tip. With the right balance of pull and push, the lens goes into the bag very nicely." He added, "If you are using larger incisions, you can still use the Akreos MICS lens, just place the cartridge in the chamber for implantation."

My Preferred Lens for Nearly Every Case

"The Akreos MICS lens is very good for routine surgery, but I also use it in many complicated cases, including high myopia and hyperopia and after vitrectomy or radial keratotomy," Dr. Malyugin said. "Its four points of fixation make the lens very stable in the capsular bag. The optics are designed to be aberration-free, which allows implantation in cases involving issues such as loose zonules or pseudoxoelastation. There is no need for a back-up lens in the majority of these cases. In addition, in cases with a compromised blood-aqueous barrier, the inflammatory reaction to a hydrophilic lens is less pronounced than with other materials."

Dr. Hunkeler said C-MICS also works nicely when intraoperative floppy iris syndrome is a factor. "The closed system it creates makes these cases easier, more controlled and safer," he said. He was skeptical about C-MICS and lens implantation through the 1.8-mm incision at first, but his opinion has changed. "The procedure is safe and effective, the lens behaves nicely in the eye, and patient satisfaction is high."

REFERENCES


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