Produced with support from Bausch+Lomb.

The Akreos MICS IOL: a clear advancement

The clinical and patient benefits of a microincisional IOL with zero spherical aberration.

BY N. TIMOTHY PETERS, MD

I was a field observation investigator for the Akreos AO Microincision IOL (Akreos MICS; Bausch+Lomb, Rochester, NY) in 2009, and I have been using the lens ever since. This model, made of the Akreos material, became commercially available in the United States in 2009. The Akreos MICS IOL represents an advancement over traditional spherical implants in that it is aspheric, yet with zero spherical aberration, and it is implantable through a 1.8-mm incision. This article describes my experience with the Akreos MICS lens and its features.

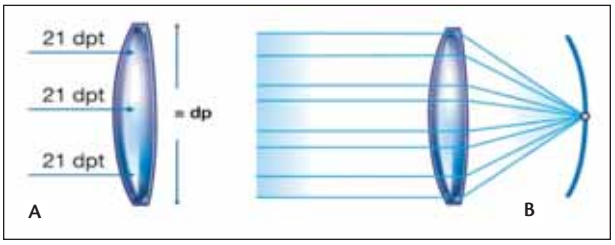
ADVANTAGES OF AN ASPHERIC, ZERO SPHERICAL ABERRATION IOL

The Akreos MICS lens is my primary choice for cataract patients who desire a monofocal IOL with an excellent quality of vision. I no longer use traditional implants with positive spherical aberration, except in patients who have undergone previous hyperopic LASIK (because this treatment induces negative spherical aberration). In most other eyes, however, spherical IOLs add too much positive spherical aberration to the optical system and degrade the quality of the image. Furthermore, although in some eyes I use negative aspheric lenses, such as the AcrySof IQ IOL (Alcon Laboratories, Inc., Fort Worth, TX), the performance of these lenses can be compromised by decentration and tilt. According to my experience, any amount of error in these IOLs' positioning can induce higher-order aberrations that may degrade the image quality—potentially beyond what the patient would experience with a positive spherical aberration implant.

The Akreos MICS IOL's dioptric power remains constant from its center to its edge. Traditional spherical lenses inherently have a different power through their center than they do at the edge, and this difference grows more pronounced as their power increases. Moreover, the Akreos MICS is the only aspheric IOL that imparts zero spherical aberration to the optical system so that it is designed to maintain or even enhance depth of field, as opposed to negative spherical aberration IOLs. These design characteristics make the Akreos MICS lens in my practice exceedingly forgiving of errors in prescription or implantation, yet it imparts better visual quality, including improved contrast sensitivity, compared with traditional spherical lenses.[1,2]

Figure 1. The Akreos MICS IOL features a unique four-haptic design for intraocular centration and stability.

I found that even if the IOL is not centered precisely between the center of the pupil and the center of the visual axis, our patients will experience better vision than they would have with a traditional spherical IOL. Although negative spherical aberration IOLs are appropriate for some patients, they are somewhat unforgiving of errors in prescription and placement, so I do not implant them routinely. Furthermore, if a patient's cornea does not contain the average amount of positive spherical aberration preoperatively, then implanting, for example, a Tecnis IOL (Abbott Medical Optics Inc., Santa Ana, CA) may worsen their quality of vision.[3] Thus, negative spherical aberration implants have a potential downside that the Akreos MICS lens does not have.



The Akreos MICS IOL has Advanced Optics, which means a uniform lens power from its center to its edge (A). This design should make the lens more tolerant of misalignment and therefore provide more predictable and repeatable refractive outcomes. The Advanced Optics lenses also have aspheric anterior and posterior surfaces that create no spherical aberration (B), thereby decreasing the overall positive ocular spherical aberration compared to spherical IOLs.

STABLE POSITIONING AND REFRACTION

Some surgeons may wonder whether the Akreos MICS' thinness (it is 30% thinner than the Akreos AO design) and unique, four-point haptic design (Figure 1) would result in vaulting after capsular contraction. Moreover, would such vaulting change the patient's prescription over time? I have seen no movement of the optic anteriorly or posteriorly, even after an Nd:YAG capsulotomy. The four-point haptic design compensates for the optic's thinness by creating two zones of strength and flexibility. The *foundation zone*, where the base of the haptics connects to the optic, is thick and rigid. The external area of the haptics, which is called the *absorption zone*, deforms in three dimensions to minimize any pressure placed on the optic. In fact, the innovative design of the Akreos MICS IOL received a Medical Design Excellence Award (MDEA) in 2008.

None of my Akreos MICS patients has experienced a change in his or her prescription. When I first began implanting this lens, my staff and I tracked our outcomes to analyze our results and fine-tune our A-constant. Our Akreos MICS patients consistently had better UCVA than those implanted with traditional spherical monofocal lenses, and they demonstrated an expanded depth of focus compared to those with negative spherical IOLs due to the remaining positive spherical aberration of the cornea. Because this IOL is designed to maintain the cornea's inherent positive spherical aberration, our patients have excellent image quality with a slightly wider circle of least confusion than my patients with negative spherical aberration implants. Even patients who are slightly myopic or hyperopic still see quite well with this lens. A small, unpublished, retrospective chart review my staff and I conducted showed that our Akreos MICS patients (n=20) had both excellent postoperative contrast sensitivity and strong depth of field.

MATERIAL AND IMAGE QUALITY

The Akreos MICS IOL is made of the proprietary Akreos biocompatible hydrophilic acrylic material that has a 10-year history of performance and safety in more than 3 million eyes worldwide. I have not had any recipients of this lens complain of glistenings or any other visual symptoms related to the lens' material, and I have never seen imperfections in these lenses at the slit lamp.

IMPLANTATION

The Akreos MICS lens will pass through a 1.8-mm phaco incision via a wound-assisted injection technique (the injection cartridge does not enter the anterior chamber). The incision's diameter is the same as the internal diameter of the cartridge to minimize stress on the cornea. I never need to enlarge the wound to insert the Akreos MICS lens, although my incision typically expands by about 0.1 mm during surgery. Every time, I am able to get the leading two haptics in the capsular bag and the trailing two haptics in the anterior chamber; the latter I simply tuck into the bag with either the second-hand instrument or the I/A tip. I find that the Akreos MICS IOL always centers immediately, and positioning the I/A tip behind the lens to remove ophthalmic viscosurgical device is never a problem.

A TECHNOLOGICAL IMPROVEMENT

In my opinion, the Akreos MICS IOL is a very safe and forgiving lens that gives patients better visual performance than traditional spherical implants. I feel that aspheric optics are so beneficial for patients that continuing to implant positive spherical IOLs will do most individuals a disservice. Unlike negative spherical aberration implants, surgeons can switch to the zero-spherical aberration Akreos MICS IOL with no impact on the optical system, and it is designed to deliver a better image quality with fewer potential drawbacks in this respect. It is a great introduction to working with aspheric optics. ✦

N. Timothy Peters, MD, is in private practice at Eyesight Ophthalmic Services in Portsmouth, New Hampshire. He is a consultant to Bausch+Lomb. Dr. Peters may be reached at (603) 501-5000; tpeters@globalv.com.

1. Santhiago MR, Netto MV, Barreto J Jr, et al. Wavefront analysis, contrast sensitivity, and depth of focus after cataract surgery with aspherical intraocular lens implantation. *Am J Ophthalmol.* 2010;149(3):383–389.
2. Shentu X, Tang X, Yao K. Spherical aberration, visual performance and pseudoaccommodation of eyes implanted with different aspheric intraocular lens. *Clin Experiment Ophthalmol.* 2008;36(7):620–624.
3. Johansson B, Sundelin S, Wikberg-Matsson A, et al. Visual and optical performance of the Akreos Adapt Advanced Optics and Tecnis Z9000 intraocular lenses: Swedish multicenter study. J Cataract Refract Surg. 2007;33(9):1565–1572.