The Akreos Micro-Incision Lens

A clinical evaluation of an IOL for microincisional cataract surgery.

BY THIERRY AMZALLAG, MD

The advantages of performing cataract surgery through incisions as small as 1.5mm include quicker healing, reduced amounts of induced astigmatism, a lesser likelihood of morphological changes to the cornea, and less postoperative inflammation.[1-3] To implant currently available IOLs, however, surgeons often must widen the corneal incision to between 3.0 and 3.2mm. A soft, foldable IOL that can be implanted without requiring an enlarged incision is therefore an attractive development.

Three such lenses are currently available in Europe but not in the US (Acri.Smart [Acri.Tec GmbH, Berlin, Germany], Ultrachoice 1.0 [Thinoptx, Abingdon, VA], and Acriflex [Acrimed GmbH, Berlin, Germany]), but I have not found any of them entirely satisfactory in the postoperative course.

Bausch & Lomb (Rochester, NY) recently developed the Akreos Micro-Incision Lens (not available in the US), which can be injected using microcartridges through an incision of less than 2mm. My group performed a pilot study to evaluate the performance of this IOL. Our objectives were to confirm that the new lens can be implanted through an incision smaller than 2mm, to evaluate two injection techniques, to assess the optical quality and intracapsular behavior of the lens, and to obtain preliminary information about the development of posterior capsular opacification (PCO) with this IOL.[4]

> "The Akreos Micro-Incision Lens is a single-piece, biconvex, hydrophilic acrylic IOL consisting of a central optic and four flexible haptics."

ABOUT THE LENS

The Akreos Micro-Incision Lens is a single-piece, biconvex, hydrophilic acrylic IOL consisting of a central optic and four flexible haptics (Figure 1). The optic and haptics have square edges, and the haptics are angulated (approximately 11°), which helps to push the lens against the posterior capsule after its implantation in the capsular bag and thus increase its stability. The lens is available in three diameters—10.5, 10.7, and 11.0mm—depending on the power, ranging from 10.00 to 30.00D. Like other IOLs in the Akreos line, the Akreos Micro-Incision Lens has a continuous 360° barrier edge to limit PCO. Table 1

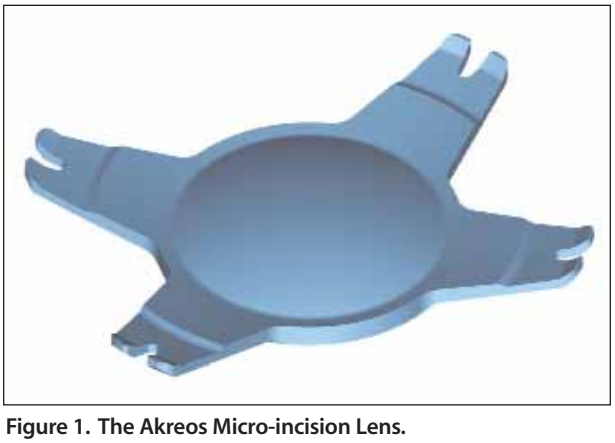

Figure 1. The Akreos Micro-incision Lens.

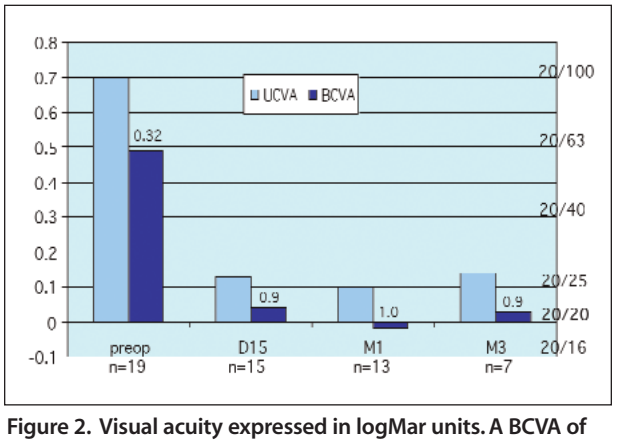

Figure 2. Visual acuity expressed in logMar units. A BCVA of ≥ +0.3 logMar (20/40) was considered a success.

TABLE 1. CHARACTERISTICS OF THE AKREOS MICRO-INCISION LENS

Polymer materials	Methylmethacrylate and hydroxyethylmethacrylate
Water absorption	26% ±2% by mass at saturation
Anti-UV treatment	Benzophenone
Refractive index when dry	1.539
Refractive index at saturation	1.458
Extension coefficient	1.128 ±0.01
Average pore diameter	2nm
Sterilization	Autoclave
Estimated A-constant	118.0

provides additional characteristics of the lens, which is designed for implantation in the capsular bag of the posterior chamber after phacoemulsification. The IOL is designed for insertion with a 1.8 Viscoglide cartridge and the Viscoject Lens Injection System (not available in the US; Medicel AG, Widnau, Switzerland).

METHODOLOGY

Study Design and Subjects

The prospective, randomized, single-center study enrolled 19 patients who were 50 years of age or older and were scheduled to undergo cataract surgery. Subjects were randomized to in-the-bag implantation of an Akreos Micro-Incision Lens via either a standard inside-the-eye (in) or outside-the-eye (out) technique (described later).

Exclusion criteria included monocular status, traumatic cataract, intraocular surgery in the previous year, previous damage to the corneal endothelium, any ocular pathology other than a cataract, and participation in another clinical trial.

Surgery

After administering topical anesthesia, the surgeon created two microincisions of 1.5mm in clear cornea, one in the superior-temporal region and the other at an angle of 90° to the first incision. Subsequently, he performed a continuous circular capsulorhexis, followed by extracapsular cataract extraction using bimanual phacoemulsification. The surgeon then injected a viscoelastic into the capsular bag through the first incision and implanted the IOL via either the in or the out technique.

The in technique involved inserting the Viscoglide cartridge through the first corneal incision into the anterior chamber and delivering the lens directly into the capsular bag. This technique requires an enlargement of the corneal incision after phacoemulsification from 1.5 to 2.3mm. In the out technique, the surgeon positioned the Viscoglide cartridge outside the eye at the lip of the incision. After injection, the inferior haptic unfolds in the capsular bag, but the surgeon must position the superior haptics inside the capsular bag by means of a micromanipulator. This technique requires a calibration of the 2-mm incision.

RESULTS

Ten subjects underwent the in technique versus nine for the out procedure. The size of the corneal incision after the IOL's implantation was not significantly different from that before its insertion for either injection technique (Table 2). Figure 2 shows the postoperative visual acuities. The estimated A-constant required an adjustment to prevent unwanted refractive errors (Table 3), and Bausch & Lomb plans to recalculate the A-constant in order to improve the accuracy of IOL power calculations.

The Akreos Micro-Incision Lens was stable in the capsular bag with no significant decentration at the 15-day, 1-month, and 3-month postoperative examinations. Although insignificant, there was a slight shift toward the back of the eye in the first 2 weeks followed by a slight shift in the opposite direction during the next 2 months. The movement only occurred in seven patients and had no overall detrimental effect on visual

TABLE 2. MEAN SIZE OF CORNEAL INCISION MEASURED BEFORE AND AFTER THE IMPLANTATION OF THE AKREOS MICRO-INCISION LENS

	In Technique (n = 10)	Out Technique (n = 9)
Before injection	2.11 ±0.08mm	1.77 ±0.07mm
After IOL's implantation	2.22 ±0.04mm	1.86 ±0.07mm
Stretch	0.11 ±0.06mm	0.09 ±0.06mm
P value (Wilcoxon test)	0.008mm	0.007mm

TABLE 3. POSTOPERATIVE ESTIMATED A-CONSTANT

	Day 15 (n = 12)	1 month (n = 10)
Target	-0.5	-0.5
Biometer	-0.58	-0.58
Expected refraction	-0.99	-0.99
Actual refraction	-0.69	-0.46
Refractive error	+0.27	+0.46
Indicated A-constant	118.9	119.3

Note: Assessed using biometric measurements obtained with the IOLMaster (Carl Zeiss Meditec Inc., Dublin, CA).

acuity. PCO results will not be available until after the 12-month follow-up examination, but we have observed none in the nine patients who have reached 3 months' follow-up.

CONCLUSION

The pilot study indicates that the Akreos Micro-Incision Lens can be inserted through corneal incisions of less than 2mm in length. The IOL has provided good visual acuity and remained centered over the pupil. The out technique was easier and faster to perform, and it required a smaller incision than the in technique.

My colleagues and I are planning to conduct a long-term monitoring program in order to confirm the performance of the Akreos Micro-Incision Lens, particularly with respect to its intracapsular stability and its limitation of PCO. ■

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