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Aberration-free Akreos Adapt AO performs well in multiple outcome measures

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in London

THE aberration-free Akreos Advanced Optics (Akreos Adapt AO, Bausch & Lomb) IOL provides excellent visual results along with enhanced contrast sensitivity, according to several studies presented at the XXIV Congress of the ESCRS.

Vladimir Pfeifer MD, University Eye Hospital, Ljubljana, Slovenia, reported results from a pilot study evaluating the clinical performance of the Akreos Adapt AO IOL in 50 eyes of 50 patients, mean age of about 70 years. Surgeons implanted the IOL through a 3.0mm incision using the Hydroport injector.

Follow-up visits conducted at one day, three weeks, three months, six months, and one year after showed excellent refractive, uncorrected and best-corrected visual outcomes under high (90 per cent) and low (10 per cent) contrast that were stable over time. Those outcomes were consistent with excellent stability, minimal development of posterior capsule opacification, and an absence of unexpected adverse events, reported Dr Pfeifer.

"Some aspheric IOLs have been designed with negative spherical aberration to offset the positive spherical aberration of the average cornea, but their performance depends on several factors. Misalignment because of surgical error or structural abnormalities as well as implantation in eyes with a cornea that is irregular or outside of the average with respect to spherical aberration can induce other higher order aberrations, especially coma, with a resultant detrimental effect on quality of vision. The aberration-free Akreos Adapt AO lens was designed to maintain consistent optical performance in a wide range of clinical situations, and the results of this study support the conclusion that it links cataract surgery with refractive principles to improve quality of vision," he said.

At one year, values for mean logMAR high contrast UCVA and BCVA were 0.007 (20/20) and -0.11 (20/16), respectively. Corresponding values in low contrast (10 per cent) testing were 0.23 (20/23) and -0.12 (20/25), respectively.

In high contrast testing, UCVA improved by an average of six lines from pre-operative values, and 95.5 per cent of eyes had UCVA of 20/40 or better. Best-corrected acuity improved by an average of five lines and was 20/20 or better in 93.5 per cent of eyes at one year. Under low contrast conditions, about 80 per cent of eyes had an UCVA of 20/40 or better and 94 per cent achieved 20/40 or better BCVA.

Akreos Adapt AO at a glance

The Akreos Adapt AO is a single-piece acrylic IOL (26 per cent water content) with four flexible haptics that enable centration and in-the-bag stability. Its optic has a 360-degree square edge to reinforce the mechanical barrier to lens epithelial cell migration and thereby the development of posterior capsule opacification (PCO). It features an asymmetrical biconvex design with aspheric anterior and posterior surfaces that make the implant spherical aberration-free. As a result, the average pseudophakic eye is left with a modest amount of positive spherical aberration that would be expected to give enhanced depth of field and create some degree of pseudoaccommodation. In addition, the Akreos Adapt AO has uniform power across its entire surface. Consequently, it should provide predictable refractive outcomes, and in contrast to aspheric IOLs with negative spherical aberration, the Akreos Adapt AO should be more tolerant to lens misalignment. The lens received the CE mark in January 2005.

Dr Pfeifer reported that these results compared very favourably with low contrast and high contrast BCVA data for a matched normal population of phakic patients with an average age of 43 years.

"In fact, the high contrast BCVA was slightly better in the eyes with the Akreos Adapt AO. These results further highlight the excellent visual performance of this unique aspheric IOL," stated Dr Pfeifer.

IOL position remained very stable over time. Between three months and one year, the optic decentred by a mean of just 0.10mm. The excellent stability of this IOL can be attributed to its haptic design, he said.

Mean EPCO scores measured for the central 3.0 and 6.0mm areas were low after one month and were virtually unchanged at one year. No eyes required Nd:YAG capsulotomy.

Akreos Adapt AO vs Tecnis

Anders Behndig, MD, PhD, University of Umea, Sweden, reported results of a Swedish multicentre study comparing the optical performance of the Akreos Adapt AO and the aspheric silicone Tecnis Z9000. Eighty patients were randomised to implantation with one of the two IOLs in one eye and the alternate in the fellow eye.

Outcomes were excellent with both IOLs. Postoperative refraction was very close to emmetropia in both groups. There were no significant differences between the eyes implanted with the Tecnis versus the Akreos Adapt AO with respect to logMAR visual acuities or contrast sensitivity at any spatial frequencies.

Wavefront measurements performed using pupil sizes of 4.0, 4.5, and 5.0mm showed that total higher order aberrations were consistently significantly less in the Tecnis eyes. The difference between groups increased with increasing pupil size and could be accounted for primarily by differences in spherical aberration. However, the Akreos Adapt AO was associated with significantly better depth of field, and that benefit also increased with increasing pupil size.

"Presumably, the difference in depth of field is due to the higher amount of spherical aberration in the Akreos Adapt AO eyes," Dr Behndig said.

Patient questionnaires revealed high satisfaction with both IOLs, with a slight majority of patients (58 per cent) considering both eyes equal. However, among those patients who expressed a preference, the Akreos Adapt AO was favoured over the Tecnis by a ratio of 2:1. Less pronounced light-associated problems appeared to be the primary factor contributing to the difference. Whereas 56 per cent of patients found no difference in dysphotopsia between eyes, 33 per cent believed there was less dysphotopsia in the Akreos Adapt AO eye compared with 11 per cent who identified the Tecnis eye as experiencing less dysphotopsia, reported Dr Behndig.

"These results suggest that maximum reduction of higher order aberrations does not seem crucial for IOL preference. Instead, patient perceptions may be influenced by other factors, such as degree of dysphotopsia, better depth of field, or other variables that are still unknown," Dr Behndig said.

Akreos vs Akreos Adapt AO

Ann Haustermans, MD, AZ KLINA, Brasschaat, Belgium, reported interim data from a multicentre, single-blind, randomised study comparing the Akreos Adapt AO and the parent model, the Akreos Adapt, in contralateral eyes of 70 patients undergoing bilateral cataract surgery.

So far, between 87 per cent and 96 per cent of patients were evaluated for visual acuity and contrast sensitivity at one and three months. Those interim results show the Akreos Adapt AO was associated with significantly less total higher order aberrations than the Adapt at both one and three months. The difference could be accounted for by significantly less spherical aberration in the Akreos Adapt AO eyes. Coma was also significantly lower in the Akreos Adapt AO eyes at three months.

Contrast sensitivity was significantly better in the Akreos Adapt AO eyes at one month at all spatial frequencies in photopic testing. In addition, the Akreos Adapt AO was associated with significantly better low contrast uncorrected and best-corrected acuity at one month.

At three months, the functional vision results for both contrast sensitivity testing and low contrast UCVA and BCVA still favoured the Akreos Adapt AO numerically. However, the only statistically significant difference detected was for better mesopic contrast sensitivity at 6 cpd.

"Assessment of these subjective outcomes is very important for determining the true value of the aspheric design. Both IOLs offer excellent visual acuity, and the loss of a statistically significant benefit of the aspheric aberration-free IOL at three months in contrast sensitivity testing was the result of improved performance of the standard IOL over time rather than any deterioration in eyes with the Akreos Adapt AO. Currently, we have no explanation to account for that change, but wonder if it might involve some brain adaptation," said Dr Haustermans.

Follow-up visits were scheduled at one day and 10 to 12 weeks after surgery and included assessment of high and low contrast UCVA and BCVA using the ETDRS chart; contrast sensitivity under mesopic (3 cd/m2) and photopic (85 cd/m2) conditions using Functional Acuity Contrast Testing (FACT) charts; higher order aberrations of the cornea (Orbscan, Bausch & Lomb) and total optical system (Zywave, Bausch & Lomb); depth of field (calculated Strehl ratio), and patient satisfaction. Patients were unaware of which eye received which IOL, and the interviewer administering the patient satisfaction questionnaire was also blinded to IOL assignment.

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