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## Highlights of the American Society of Cataract and Refractive Surgery (ASCRS) 2005 Symposium on Cataract, IOL, and Refractive Surgery

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### Cataract Surgery

The annual symposium of the American Society of Cataract & Refractive Surgery (ASCRS) took place in Washington, DC, from April 15-20, 2005. The meeting's paper sessions highlighted the increasing experience of investigators with new cataract, refractive, and corneal surgical techniques/technology. This article will discuss the major findings.

Topics of continued interest in cataract surgery included microincision phacoemulsification, intraocular lens (IOL) advances for management of presbyopia, and the newly recognized intraoperative floppy iris syndrome.

#### Microincision Cataract Surgery (MICS)

Bimanual phacoemulsification cataract extraction, with separation of the phacoemulsification tip/aspiration handpiece from the infusion/second instrument handpiece, continues to receive a significant amount of attention. The technique permits cataract removal through small incisions, with improvement in anterior chamber stability, reduction in surgically induced astigmatism, and a potential decrease in ultrasound energy. However, conversion to this new technique has a definite learning curve, which may require a significant number of cases to deliver a complication rate comparable to conventional coaxial phacoemulsification.<sup>[1,2]</sup> Multiple investigators described their experience with different platforms and instruments for bimanual phacoemulsification.<sup>[3-5]</sup> Histologic and ultrastructural wound changes in bimanual phaco were compared with surgery performed with coaxial infusion.<sup>[6,7]</sup> The bimanual wounds showed greater levels of collagen damage consistent with burning, internal disruption of Descemet's membrane, and peri-wound endothelial cell loss. However, the clinical significance of these findings is undetermined. No difference in central endothelial cell loss was found between bimanual and coaxial cataract cases in a study by Rita Mencucci, MD.<sup>[8]</sup>

MICS techniques using small-sleeve coaxial infusion were presented by several authors. Takayuki Akahoshi, MD<sup>[9]</sup> successfully performed phacoemulsification with the Inifiniti (Alcon Labs, Fort Worth, Texas) system through a 1.7-mm incision, followed by injection of single-piece AcrySof (Alcon Labs) IOL. He also used a small-diameter infusion sleeve with a third port directed inferiorly to increase irrigation, improve chamber depth, and maintain separation between the phaco tip and the posterior capsule.<sup>[10]</sup> "Ultrasleeve" techniques were also described by Donald Serafino, MD,<sup>[11]</sup> and Khiun Tjia, MD.<sup>[12]</sup>

#### Accommodative and Pseudoaccommodative Intraocular Lenses

Presbyopic correction with cataract surgery or refractive lens exchange is becoming more feasible with advances in IOL design. Several papers provided updates on the different lens technologies in current use or in development. The Crystalens (Eyeonics, Aliso Viejo, California), a single-optic accommodating silicone IOL approved for use in November 2004, was the subject of several papers. Steven Dell, MD,<sup>[13]</sup> reviewed the 3-year results for the US Food and Drug Administration (FDA) clinical trial. Three hundred sixty-eight unilaterally and 123 bilaterally implanted patients were examined. Ninety-eight percent had uncorrected distance visual acuity (UCDVA) of 20/40 or better and 98% had uncorrected near visual acuity (UCNVA) of J3 or better. All patients had distance corrected near visual acuity (DCNVA) of J3 or better. Wavefront analysis using the Tracey Visual Function Analyzer in a subset of patients demonstrated a refractive change (myopic astigmatism) with accommodation, suggesting movement of the optic within the eye. The accommodative effect of the Crystalens appeared stable in this group of patients at 3 years following implantation.

Christopher Starr and colleagues<sup>[14]</sup> offered their results following 1 year of Crystalens implantation. All patients achieved best corrected distance visual acuity (BCDVA) of 20/25 or better, while 60% had UCDVA of  $\geq$  20/25. UCNVA was J5 or better in 85% and DCNVA was  $\geq$  J5 in 95% of patients. The authors felt that UCDVA was limited in this group of patients by preexisting astigmatism, prior LASIK surgery, and eyes that were larger/smaller than normal. Another series of bilateral Crystalens implantation with 2 years of follow-up was presented by Carlos Verges, MD.<sup>[15]</sup> Fifty eyes of 25 patients received the accommodating IOL, with 90% obtaining UCDVA  $\geq$  20/30 and 96% with BCDVA of 20/30 or greater. DCNVA was J3 or better in 92% of cases, with only 8% achieving J1. Twenty-four percent

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reported halos and 39% developed posterior capsule opacification requiring YAG laser capsulotomy. Other authors reported similar findings with the Crystalens, achieving accommodative amplitudes in the range of 1-2D.<sup>[16,17]</sup>

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One-year results for the Synchrony (Visiogen, Irvine, California) dual-optic accommodating IOL were offered by Ivan Ossma-Gomez, MD.<sup>[18]</sup> Twenty-five eyes were implanted with the single-piece, foldable silicone IOL and demonstrated a mean accommodative range of 2.87D. High-definition ultrasound biomicroscopy showed forward movement of the anterior optic, as well as an increase in the inter-optic gap, by up to 0.83 mm.<sup>[19]</sup> The results of these studies reflect the higher accommodation-to-movement ratio in dual-optic accommodating IOLs, compared with single-optic designs. BCDVA was 20/40 or better in 97%, while DCNVA of  $\geq 20/40$  was seen in 94% of eyes.

The ReStor (Alcon Labs, Fort Worth, Texas) pseudoaccommodating multifocal IOL was approved for use by the FDA in April 2005. This IOL uses an apodization process to create concentric steps on the lens surface -- thereby creating a hybrid diffractive-refractive optic to provide balanced distance and near vision. Anja Liekfeld, MD, discussed the 1-year results for 118 patients who underwent bilateral implantation of the ReStor IOL. UCDDVA and BCDVA of 20/25 or better were achieved in 84% and 97% of eyes, respectively. UCNVA was  $\geq 20/32$  in 88% and DCNVA was 20/32 or better in 93% of eyes. At the 6-month postoperative visit, 88% reported never wearing glasses for distance and 85% for near, as compared with 6% prior to surgery. In another series, 25 patients who received bilateral ReStor IOLs functioned comfortably without glasses for both near and distance activities, reported Robert Kaufer, MD.<sup>[20]</sup> Near vision was considered excellent/very good in 96% and good in 4% of patients. All patients found their distance vision to be excellent/very good and expressed spectacle independence. Several other papers were presented which showed similar visual results.<sup>[21-25]</sup> A quality-of-life study comparing patients with bilateral ReStor IOLs to those with bilateral AcrySof MA60BM IOLs was presented by Robert Cionni, MD.<sup>[26]</sup> Both groups showed similar reductions in glare complaints following cataract surgery. The ReStor patients reported significantly less limitation in social activities without glasses and experienced overall greater satisfaction. Andrew Maxwell, MD,<sup>[27]</sup> found no significant difference between ReStor and AcrySof patients with regard to photopic/mesopic contrast sensitivity and performance in a night driving simulator.

The Array (Advanced Medical Optics, Santa Ana, California) silicone multifocal IOL, a well-established FDA-approved lens, uses refractive optics with concentric optical zones weighted for near and distance focal points. The Array 2 is a new multifocal IOL made of acrylic, rather than silicone. Magda Rau, MD,<sup>[28]</sup> compared visual results in 40 patients with bilaterally implanted Array IOLs to those in 40 patients with bilateral Array 2 IOLs. Visual outcomes were very similar between groups, with mean UCDDVAs of 0.72 for the Array and 0.73 for the Array2. Mean UCNVAs were 0.72 and 0.68 for the Array and Array 2 groups, respectively, with 35% and 39% expressing spectacle independence. Glare complaints were reduced by 69% with the acrylic IOL. Dr. Rau<sup>[29]</sup> also presented results for 11 patients receiving bilateral Tecnis (Advanced Medical Optics) multifocal IOLs. Mean UCDDVA was 0.92 and mean BCDVA was 0.98. The mean UCNVA was 0.92, with 82% of patients achieving spectacle independence. Eighteen percent complained of disturbing haloes and 9% of glare. All patients were satisfied with the surgical outcome. These studies show promising results for accommodating and pseudoaccommodating IOL technology.

#### A New Syndrome

David Chang, MD, and colleagues<sup>[30]</sup> characterized a newly recognized, small pupil syndrome associated with cataract surgery, the intraoperative floppy iris. Intraoperative floppy-iris syndrome (IFIS) is associated with the systemic use of alpha-1 receptor antagonists, such as tamsulosin, and is characterized by iris billowing, prolapse, and progressive intraoperative miosis. Their retrospective chart review of 706 cases determined the frequency of tamsulosin use and the percentage of patients manifesting IFIS. They also performed a prospective study of 900 cases with a similar analysis. Three percent of patients and 3% of eyes in the retrospective study were taking tamsulosin for benign prostatic hypertrophy (BPH), of which 64% demonstrated IFIS. The prospective arm had 2.3% of patients manifesting IFIS. Nineteen of these 21 eyes were taking tamsulosin. Surgical management included pupil stretching, sphincterotomies, viscodilation, iris hooks, and mechanical pupil dilators (eg, Perfect Pupil). The authors found pupil stretching and sphincterotomies to be ineffective management tools. They also found posterior capsule rupture to be more common in eyes with IFIS. Specific preoperative questioning with regard to tamsulosin use with subsequent surgical planning is recommended.

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