



Lens and Cataract Surgery Update 2008



Figure 1. PVI team of doctors for patients undergoing lens and cataract surgery: Victor M. Chin, MD, Director of Lens and Cataract Surgery; Ella G. Faktorovich, MD, Director of Refractive and Corneal Surgery; Scott F. Lee, OD, Director of Clinical Care and Research; Gina Day, OD, Director of Binocular Vision Program.

While 2007 was the year of multifocal IOLs to correct presbyopia after lens and cataract surgery, this year the accommodating IOLs have taken center stage. Providing our patients with a more physiologic solution for distance-near vision with optimized day and night-time acuity, the latest generation of accommodating IOLs helped raise the bar for vision outcomes we can give to our patients.

While not all patients want to be without glasses, most want to know exactly what kind of vision they can anticipate after lens surgery, how likely they are to achieve it, and if they are not exactly where they want to be, what options we can offer them to bring about the desired outcome. 2008 is the year when our lens and cataract patients became like our LASIK patients – expecting excellent and predictable vision outcomes.

At Pacific Vision Institute, we apply specific algorithms to different refractive errors and various eye conditions to determine what surgical (or non-surgical) vision correction option will best fit each patient. Hyperopes and high myopes are likely to benefit from refractive lens exchange (RLE) with either astigmatism-correcting or presbyopia-correcting IOLs. Most patients with cataracts are also excellent candidates for these IOLs.

Patients with certain ocular conditions are given special considerations. Small pupil, ocular surface conditions, pseudoexfoliation, glaucoma, history of glaucoma surgery, history of ocular trauma, and retinal conditions are assessed prior to recommending presbyopic IOL. The type of lens chosen for the patient will depend on their vision needs and their eye health. Overall, the latest generation accommodating IOLs have taken central stage. We are also treating patients with previous LASIK, PRK, RK, LTK, and CK. Special considerations are taken into account during IOL calculations in these patients because of their corneal shape. Corneal enhancement surgery needs to be readily available to them to fine tune their vision after lens surgery to the same level as it was after their original corneal surgery. Laser vision correction has, in fact, become an integral part of achieving desired vision outcome in all patients undergoing lens and cataract surgery, regardless whether or not they had previous corneal surgery.

Lens selection and postoperative refractive outcome are a multi-disciplinary team approach. Life-long refractive history is assessed and target refractive outcome is planned with the co-managing optometrist. Ocular assessment and IOL calculations and performed by lens and cataract surgeon who determines the type of procedure and IOL that are best for the patient. Corneal analysis and laser vision correction enhancements, if necessary, are performed by corneal and refractive surgery specialist. Postoperatively, ocular surface is managed and patients counseled through the healing and vision adjustment period. Binocular vision and accommodative function are optimized through office- and internet-based vision

therapy programs. The entire team is involved from the beginning to the completion of the process to facilitate successful outcome for each patient.

Accommodating IOLs

At Pacific Vision Institute, we use all types of presbyopic IOL, depending on each patient's anatomic considerations and vision needs. Crystalens (Bausch & Lomb) is unique because, unlike other presbyopic lenses that are multifocal, Crystalens is a single focus lens. It achieves distance-near vision through the movement of the optic forward during viewing of near objects. Such action is possible because the hinges between the optic and the haptics are flexible.

Since the introduction of the first-generation Crystalens in 2003, two modifications have been made to optimize stability and predictability. The first revision created Crystalens AT-45SE, which, with its square-edged optic, showed a reduced incidence of asymmetric capsular fibrosis and, therefore, capsular contractions and IOL tilt. In the third-generation lens, Crystalens Five-O, the lens diameter was enlarged from 4.5 to 5.0 mm, the shape of the haptic plates was changed to square to optimize capsular support, and the haptic arc was increased to create greater stability.

The latest, fourth generation, Crystalens HD has been further enhanced to ensure excellent vision at all distances, without loss of contrast sensitivity. This has been accomplished by slight reduction in the spherical radius of the optic in the center of the HD lens to optimize image quality over the full range of distances (**Figure 2**).

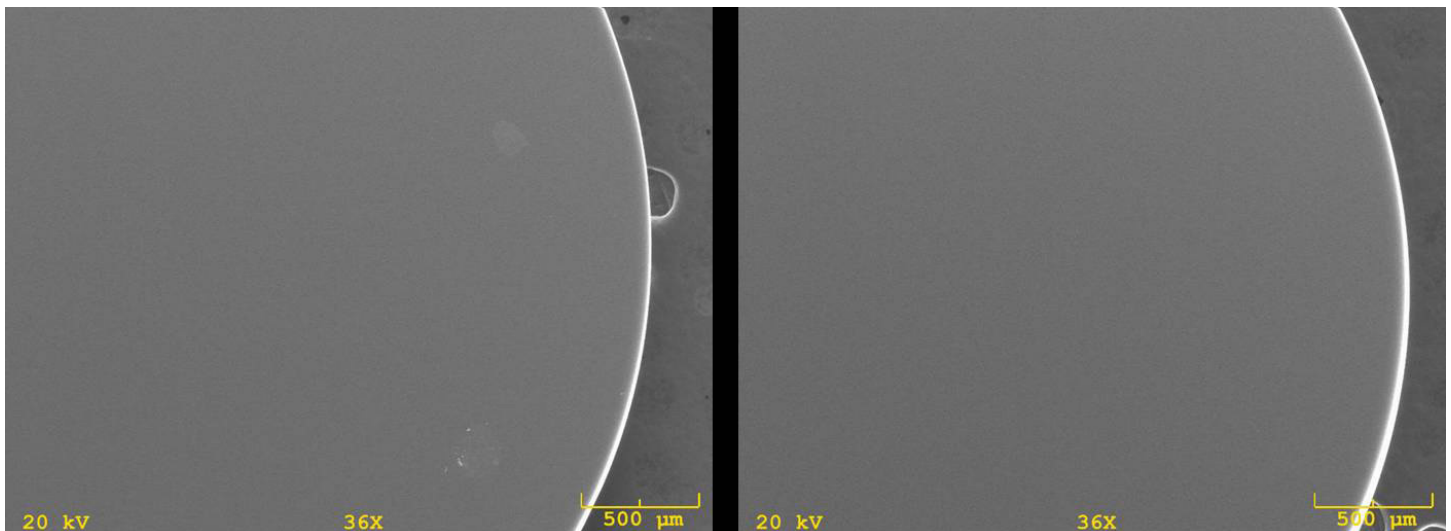


Figure 2. 36x magnification of Crystalens HD (left) and Crystalens Five-O (right). Slight reduction in the spherical radius of the optic in the center of the HD lens is contributing to the improved near vision with this lens.

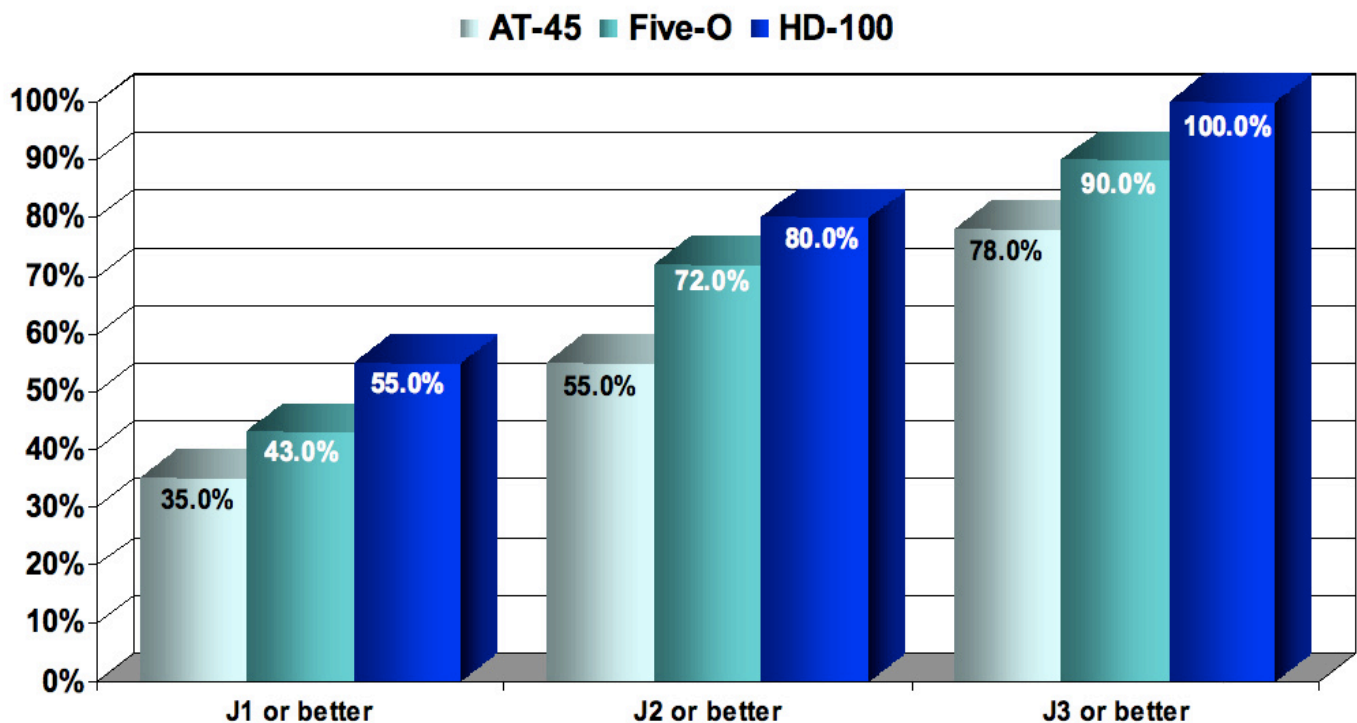


Figure 3. 80% of patients with Crystalens HD could read J2 or better uncorrected after surgery with eyes emmetropic at distance. More than half read J1 uncorrected.

A prospective, multicenter clinical trial has confirmed the effectiveness of Crystalens HD. The study involved 139 eyes of 123 adult cataract patients treated for aphakia secondary to the removal of a cataractous lens. Patients underwent small-incision cataract surgery with phacoemulsification and capsulorhexis and were implanted with Crystalens HD. 80% of patients with Crystalens HD could read J2 or better uncorrected after surgery with eyes emmetropic at distance (**Figure 3**). More than 50 % read J1 uncorrected. Contrast sensitivity was high and night-time vision was not affected.

With Crystalens HD implantation, patients can see better both far and near while preserving good night time vision. Not everyone is a candidate for these lenses and cataract surgery needs to be performed well in order to preserve optimal anatomy to facilitate proper function of these lenses.

Pearls for successful management of Lens and Cataract Surgery patients: take it to the “next” level

- **Every patient needs to be considered for presbyopia-correcting IOL.** Patients are aware of the availability of the lenses and will be disappointed if this option was not presented to them during their decision-making process.
- **Not every patient is a candidate for presbyopia-cor-**

recting IOL. Ocular surface, cornea, iris, pupil, retina, optic nerve, neurologic function is assessed and vision expectations are discussed with each patient. Patients with previous surgery, such as glaucoma surgery, for example, may need special considerations in IOL selection. Extensive analysis of the visual axis is performed before we recommend a presbyopia-correcting IOL. If a patient desires ametropia postoperatively, such as regaining the mild myopia of their youth, for example, and they want to continue wearing glasses, monofocal IOLs may be the best plan.

- **Not every presbyopia-correcting IOL is right for every patient.** Patients who are looking for mostly near vision, may do best with multifocal IOLs. But if their pupils are small and non-reactive, some of the multifocals may not work well because these lenses rely on good pupillary dilation to access some of the distance and near zones. Patients who need good vision to drive at night, may also not be the best candidates for multifocals due to possible glare and haloes. These patients will do better with accommodating IOLs.
- **Refractive history needs to be evaluated when planning postoperative vision outcome.** While most hyperopes want to see better at all distances without glasses, patients with life-long history of myopia up to -4.0 D may prefer to retain excellent near vision and wear

distance glasses after their cataract surgery. Sometimes, even the older high myopes, may prefer some residual myopia OU to allow good uncorrected near vision. They may be OK with distance glasses.

● **Astigmatism management is important in lens and cataract patients.** Prior to lens and cataract surgery, we assess patient’s astigmatism with the following 4 methods: refraction, placedo-disc topography, Pentacam, and IOL master. This analysis is based on the study we presented at 2007 Annual ASCRS meeting “Comparison of Astigmatism Measurements with Pentacam, Humphrey Topography, IOL Master, and Manifest Refraction” (**Table 1**). In this study, we compared astigmatism value and axis in 20 eyes of 40 patients (mean +/- SD age 35.8 +/- 5.47) with myopic astigmatism and normal ocular health, including clear crystalline lenses. Although the difference between the methods was not statistically significant, some difference was detected, especially in measuring the axis of astigmatism. This difference may be important when correcting astigmatism intraoperatively – either with limbal relaxing incisions or the positioning of toric IOL. Which method is the most accurate? In patients whose vision is being corrected with glasses, contacts, LASIK, PRK, or ICL, we rely on manifest refraction. But in patients whose lenses we are replacing, what technology should we rely on in determining astigmatism that we may be correcting simultaneously with lens replacement surgery? The closest correlation to manifest refraction was detected with Humphrey Topography for the astigmatism value and with IOL Master for the astigmatism axis. We utilize the following methods of astigmatism management intraoperatively – position of the incision, limbal relaxing incisions, and toric IOLs. Postoperatively, if residual astigmatism bothers the patient, we can fine tune their vision with LASIK or PRK

● **Corneal assessment must be a part of lens/cataract consultation.** Considering that most patients would like a predictable refractive outcome, we keep LASIK

	Cylinder value (Mean+/- SD)	Cylinder axis (Mean+/- SD)
Refraction	0.78 +/-0.75	60.43 +/- 55.85
Humphry	0.90 +/- 0.54	103.19 +/- 41.05
Pentacam	0.99 +/- 0.58	98.50 +/- 39.32
IOL Master	1.05 +/- 0.62	89.43 +/-35.74

Table 1. Comparison of cylinder value and axis measurements with 4 different techniques in patients without previous refractive surgery. Data presented at the annual ASCRS meeting, San Diego, April 2007.

or PRK enhancement in mind for most of our patients undergoing lens and cataract surgery. Their corneas and ocular surface are assessed just as we do the patients who present for primary LASIK or PRK. If there is significant corneal irregularity, for example, keratoconus, and corneal refractive enhancement will not be possible, we counsel the patient about the need for glasses or contact lenses postoperatively. A well-prepared patient is a satisfied patient.

● **LASIK or PRK enhancement should be considered as an option for fine-tuning both distance and near vision.** In patients with the refractive outcome different

Target Refraction	
● Distance	plano vs. ammetropia
● Intermediate	plano vs. ammetropia
● Near	plano vs. ammetropia
Presbyopic IOL	yes vs. no
● Type	Crystalens HD-500 vs. ReZoom vs. Restor
Astigmatism management	
● Intraoperative	wound position vs. LRI's vs. toric IOL
● Intraoperative	LASIK vs. PRK
● Intraoperative	wound position/LRI's/toric IOL
Postoperative management	
● Intraoperative	ocular surface vs. YAG vs. CME
● Intraoperative	glasses vs. contacts vs. LASIK vs. PRK
● Intraoperative	office VT vs. Internet VT vs. both

Table 2. Achieving predictable vision outcome after cataract and lens surgery: decision algorithm

than the planned one, LASIK or PRK can improve their satisfaction. Distance blur due to small amounts of astigmatism can easily corrected with LASIK or PRK. If a patient feels that they don’t have adequate reading vision after presbyopic IOL surgery, a 1.0D add in non-dominant eye with LASIK or PRK can bring them almost immediate satisfaction. At PVI, we have low threshold for laser vision correction enhancements in lens and cataract surgery patients.

● **Postoperative vision may be optimized with YAG capsulotomy, ocular surface and tear film management, treatment of retinal swelling, if any, vision ther-**

apy and improvement of vision function. The goal of lens and cataract surgery is a satisfied patient. If a patient is not happy with their outcome, the entire visual axis is carefully assessed and fine-tuned, if necessary. Just like in LASIK and PRK patients, the binocular vision function may also need to be evaluated and treated if suboptimal functioning is detected. Most importantly, every attempt is made not to dismiss patients' concerns but to address them.

Table 2 summarizes the steps taken to facilitate predictable refractive outcomes and satisfied patients. ■

Case examples

Patient 1. 54-year-old CEO of Fortune 500 company underwent RLE with ReZoom OU to correct +4.0D of hyperopia OU. Goal = emmetropia. Postoperatively, UCVA was 20/15 OU distance with plano refraction OU. At near, he was J3. Patient was satisfied with his intermediate (computer) vision, but unhappy that he was not able to see his Blackberry unless he used readers.

What is the next step?

Micro-monovision (up to -1.25D) may successfully improve near vision in pseudophakes with presbyopic lenses. The patients with ReZoom and older-gen-



eration Crystalens IOLs, for example, are already getting some "add" from their presbyopic lenses to help them with intermediate activities, such as computer work, for example. Micro-monovision with LASIK or PRK in their non-dominant eye can improve their near vision without effecting distance or intermediate vision. We tried a +1.00 D contact lens in this patient's non-dominant eye. He liked his vision with

the contact lens. We then proceeded with IntraLASIK in that eye with the goal of -1.00D postoperatively. The goal was achieved and the patient was satisfied with his uncorrected vision at all distances.

Patient 2. 60-year-old avid mountain biker underwent LASIK OU 10 years ago to correct -7.00D of myopia. Goal = emmetropia. Postoperatively, he was plano OU. He recently presented with slowly decreasing vision OS and refraction of -2.50-0.75x180 OS. 2+ NS was noted, but BSCVA was 20/20. In the right eye, his



vision was 20/20 with plano refraction and trace NS.

What is the next step?

Lenticular changes are most likely responsible for his refractive shift in the left eye. Although his BSCVA is good, the anisometropia and the desire for better uncorrected vision warrant the removal of the cataract. Removing the cataract should restore distance vision. How about near vision? This is an excellent opportunity to provide the patient with near vision as well. He reads mostly on the computer, but does drive at night sometimes to his second home in Mendocino. The patient wants good night time vision. Cataract surgery was performed with Crystalens HD. Postoperatively, the result was 20/20 UCVA and J2 near vision, with good contrast sensitivity and no night-time vision symptoms.

Patient 3. 63-year-old accountant with life long history of -3.50 OU and multiple trifocal glasses in fashion frames presents with decreasing vision in glasses. On examination, BSCVA is 20/40 OU, manifest refraction is -4.00 - 0.75 x 180 OD and -4.25 - 1.00 x 175 OS. 3+ NS cataracts are present OU. Patient wants to see better.

What is the next step?

Discussing the desired refractive outcome with the patient will help determine target postoperative refrac-



tion. This patient wants to remain myopic (to see near when she puts on her make up and threads a needle) and she wants to continue wearing glasses most of the time. She is used to trifocals and her glasses are her “fashion statement” and part of who she is. The best procedure for this patient is cataract surgery with monofocal IOL placement, targeting -3.50 D OU.

Patient 4. 50-year old woman is interested in seeing better without glasses. She is currently in trifocals. Her manifest refraction is +5.50 - 2.00 x 180 OD and +3.50 - 2.50 x 180 OS. She spends most of her days taking care of her grandchildren - driving them to and from school and to after-school activities.

What is the next step?

Laser vision correction may be considered, but her hyperopia is high and, at 50, her accommodation is mini-



mal. This patient is, therefore, an excellent candidate for RLE. What kind of IOL is the best option for her - presbyopic or astigmatic? Presbyopic IOLs currently don't correct for astigmatism. One may consider a presbyopic IOL with LRIs, but LRIs will not correct her astigmatism fully. She will, most likely, need additional laser vision correction for residual astigmatism to give her optimal distance vision without glasses. Distance vision is most important to her, because of her driving. We, therefore, recommended RLE with astigmatic IOL and LRI for a full distance correction with a single procedure. She is OK with wearing glasses for near work. ■

Calendar of PVI Grand Rounds

By invitation only:

- 02/19/09 Lens and Cataract Surgery Grand Rounds – postop patients will be presented for examination, Pacific Vision Institute, San Francisco, CA
- 04/24/09 8th Annual San Francisco Cornea, Cataract, and Refractive Surgery Symposium

Sight Gags by Scott Lee, O.D.

Book on Amazon.com



“I don’t care if you put me on your Naughty List. I still have to dilate your eyes.”

Scott F. Lee, O.D., Editor-in-Chief, eFocus.

Contact information: drlee@pacificvision.org, 415.922.9500