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# Three tipping points in refractive cataract surgery


Richard L. Lindstrom, MD

Dr. Lindstrom is founder and attending surgeon at Minnesota Eye Consultants in Minneapolis. He can be contacted at rllindstrom@mneye.com.

## Status report on the continuum toward super vision, phaco-less cataract surgery, and presbyopia correction without compromise

by Richard L. Lindstrom, MD

The American Society of Cataract & Refractive Surgery has initiated a large clinical survey of more than 1,500 surgeons to assess clinical opinions and practice patterns. The 2014 survey resulted in 268 data points, 137 questions, and it has allowed us to look at some of the unmet needs in regard to education. This activity, "Three tipping points in refractive cataract surgery: A status report on the continuum toward super vision, phaco-less cataract surgery, and presbyopia correction without compromise," was created because of the survey respondents' results. ASCRS has always had a goal of developing educational content that closes gaps in knowledge. We have traditionally used audience response questions to achieve that goal, and ASCRS has now created what I believe to be the most compelling programs that address some of the more controversial issues facing our membership.

Laser-assisted cataract surgery is certainly among those topics. The 2014 ASCRS Clinical Survey[1] found most members do not believe laser-assisted cataract surgery provides any improvement over conventional cataract surgery, in capsulorhexis, lens fragmentation, or arcuate incisions. A good 35% of respondents say we don't have enough data to have a strong opinion.

When it comes to presbyopia correction, the majority of respondents believe the current iteration of IOLs provides good near and distance vision, but intermediate vision is not as acceptable.

Almost a quarter of us do not assess outcomes with our laser vision correction patients, and 63.6% believe "success" is the percentage of patients with 20/20 vision. Yet the advances in laser vision correction technology can generate visual acuity significantly better than 20/20.

**Reference**

1. ASCRS Clinical Survey 2014. Global Trends in Ophthalmology. Fairfax, VA: American Society of Cataract & Refractive Surgery, 2014.

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**Educational Objectives**

Ophthalmologists who participate in this course will:

- Discuss the quantity and quality of the available literature and studies demonstrating the key outcome differences between LACS and conventional cataract surgery, astigmatism management, effective lens position, effective phaco time/energy;
- Identify the new level of diagnostic information that can be obtained and treated on both the cornea and the entire optical system to better understand the minute aberrations that impact the origins of patients' visual quality and satisfaction, and demonstrate the benefits and practice implications of assessing LVC outcomes beyond 20/20 UCVA; and
- Increase knowledge of the clinical impact of both chromatic aberration and depth of focus, to improve proper lens selection and maximize the visual quality in today's presbyopic patients.

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Mark H. Blecher, MD

Dr. Blecher is co-director of the cataract service at Wills Eye Institute in Philadelphia and is in practice at Philadelphia Eye Associates. He can be contacted at mhbmd@comcast.net.

# Laser-assisted cataract surgery: driving for perfection

by Mark H. Blecher, MD

As ophthalmologists, we continually strive to give our patients the best possible vision. Even when we're performing cataract surgery, we believe something could still make our outcomes better. Our goal is happy patients. Visual outcomes are crucial but irrelevant if the patient leaves our care unhappy. Some examples of this are a –3 D patient who is corrected to 20/15 postop but unhappy because he/she has to wear reading glasses, or the patient who was unaware a monofocal lens would not necessarily reduce the need for spectacles. As surgeons, we need to clearly define patients' visual goals and needs, and then we need to ensure we have the appropriate tools and modalities to achieve those goals. With today's modern cataract surgery, those tools include laser-assisted cataract surgery (LACS), improved technology IOLs, and tools for laser vision correction to handle any residual refractive surprises. Just as important is the ability to reproduce results—time and time again. Techniques that can provide consistently reproducible outcomes will inevitably prove beneficial to our practices and our bottom lines.

## Growing use of LACS

There has been an increasing amount of interest in LACS, with evidence in the peer-review literature as well. In 2005, there was only one published paper on the topic. By 2013, there were 88 papers published with hard data from original research. That research has shown LACS can help improve capsulorhexis creation and therefore lens centration, arcuate incisions, and lens fragmentation.

A poorly centered capsule can result in a malpositioned haptic and IOL decentration.[1,2]

Figure 1 shows a 1-piece lens half in the bag, half in the sulcus; ultrasound biomicroscopy confirms the situation.

Capsulorhexis centration is crucial to ensuring excellent outcomes. In my hands, I prefer capsular bag centration. Studies have confirmed laser-created capsulotomy is more consistent than manual.[3]

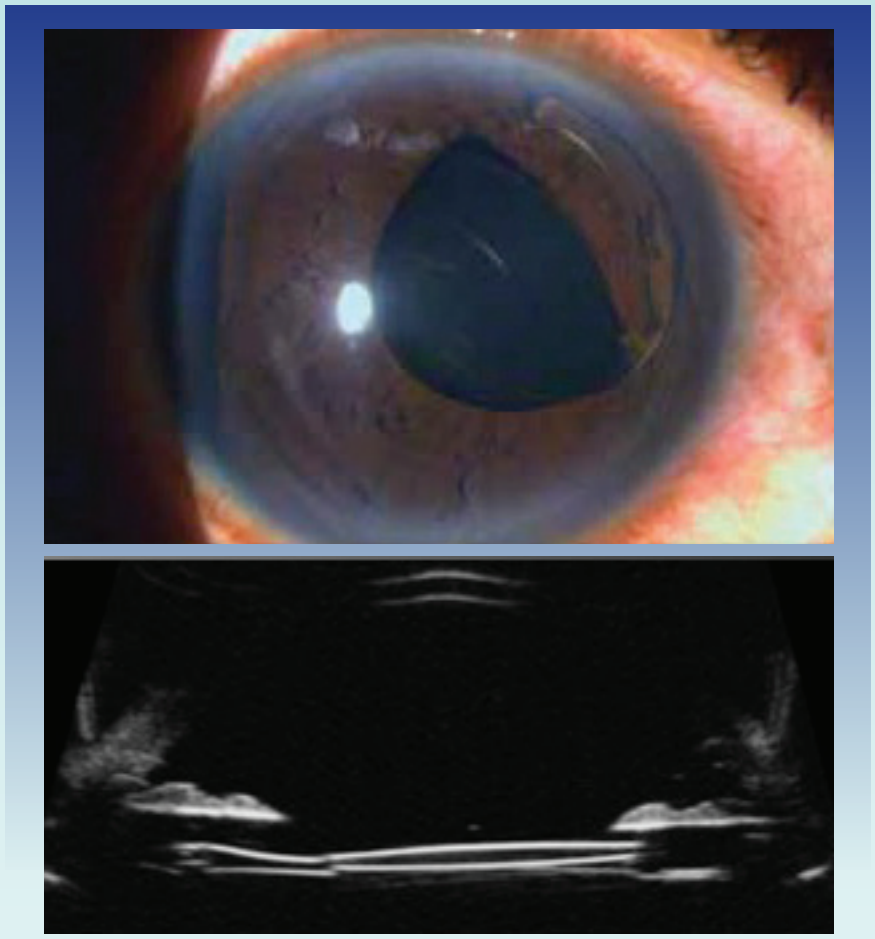

Figure 1. A poorly centered capsule can result in IOL decentration.

Source: N. Fram, MD

Presented at the 2013 ASCRS•ASOA Symposium & Congress, Wiley et al. analyzed 50 consecutive surgeries (16 pupil, 34 scanned capsule) over a 2-month period.[4] The capsulorhexis position was guided by the laser software interpretation of the capsule bag center, based on the laser-obtained OCT images. The group showed complete IOL optic overlap was better with scanned capsule (100%) than with pupil centration (75%).

There are more and more studies being discussed on the podium and in the literature that argue the femtosecond laser consistently provides better centration of the capsulotomy than manual techniques. What we have not yet shown categorically is whether the femtosecond laser will also help us improve our refractive outcomes. Those studies (understandably) take significantly longer to parse out over the long term.

## Limbal relaxing incisions

Astigmatic correction can be achieved through toric lenses or through limbal relaxing incisions (LRIs). Measuring astigmatism consistently across patients and across visits (especially for those with lower levels of astigmatism) is sometimes challenging. Incisions may be a science, but the response remains unpredictable, due to patient age, corneal diameter/curvature, pachymetry, corneal biomechanics, or intraocular pressure.

The femtosecond laser creates precise dissectible arcuate incisions that are consistently more uniform than what can be created manually with a diamond blade. Studies have shown that for astigmatism correction, LACS is able to treat low levels of cylinder and is more precise in preop measurements and axis alignment.[5]

Using femtosecond lasers allows surgeons to fully customize and adjust their arcuate incisions on

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a case-by-case basis.[6] I personally prefer the Donnenfeld nomogram (available at www.lricalculator.com). Surgeons are left to determine what percentage of the nomogram they will use; the optical zone is fully adjustable as well. **Julian Stevens, FRCOphth**, has developed a nomogram for femtosecond laser intrastromal astigmatic keratotomy that involves 20% above and below left untouched, with a 90-degree incision.[7] I personally prefer intrastromal because these arcuate incisions are less invasive—I dislike opening the cornea. Intrastromal arcuate incisions offer numerous advantages: no penetration of the epithelium, fast visual recovery, no foreign body sensation, minimal wound healing response, fine control of astigmatism correction, and a minimized likelihood for infection.

## Lens fragmentation

LACS lens fragmentation can, in some cases, allow surgeons to proceed without any phaco, and reduces the amount of phaco necessary in most cases and increases the ability to use I/A alone.[8,9] Each of the femtosecond platforms can precleave and soften the lens. The amount of phaco energy used will depend upon the fragmentation pattern chosen.

In conclusion, LACS provides improvements in overall levels of predictability and consistency that on aggregate will improve outcomes. Studies have shown—and are continually showing—LACS is beneficial for small amounts of astigmatism by providing greater precision and accuracy than manual procedures. LACS provides superb predictability in the capsulorhexis and with IOL centration, and provides ease of nucleus removal with less energy, less inflammation, and increased safety.

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# *Discussion*

**Dr. Lindstrom:** To begin the discussion, if you're going to have a resident do a case, does the femtosecond laser make it easier?

**Dr. Blecher:** At Wills Eye Hospital, we're fortunate enough to allow all our residents to do their cases with a femtosecond. The company we use has agreed to provide free interfaces so all of our residents can be certified in the laser. We have begun training and certifying all of our third-year residents in the use of the femto. One of our residents presented at the European Society of Cataract & Refractive Surgeons meeting that their outcomes with femto and non-femto across the entire year were no different. At Wills, each resident performs close to 200 cataract surgeries, and maybe 10 of those will be with the femto laser. But it was interesting to learn there was no negative aspect, and from what I've seen, it will be incorporated fairly easily into their armamentarium.

**Dr. Lindstrom:** Dr. Dell, when you do femto, is it because surgical aspects are easier or because you're hoping some aspect is better?

**Steven J. Dell, MD:** It took us a long time with the IntraLase to drill down deep enough to tease out the clinical benefit over mechanical microkeratomes, and during that time, the lasers were getting better. For me, the primary benefit of femto for cataract surgery is capsulotomy. I don't have difficulty fragmenting the lens, and my diamond corneal incisions rival or surpass what I get with femto.

**Dr. Lindstrom:** Dr. Blecher, what about anterior capsule rim tears? That's the nightmare for everyone. Is this a myth, or is it real?

**Dr. Blecher:** We're still sorting all that out, I think. Some of the papers that discussed that were using first-generation lasers, and some of the results were very laser-specific. Those same authors upgraded their lasers and the numbers that report larger capsular tear percentages dropped by 95%. At Wills we have not seen a single capsular tear in our entire institution. I do not believe it's an issue if you're using current technology and you're well trained. Can you get it? Theoretically, of course. Nothing is perfect.

**Dr. Dell:** I agree. I think it is somewhat platform-specific, but I've been satisfied with the capsulotomy.

**Dr. Lindstrom:** I haven't had an anterior capsule rim tear in a femto case either, but it is something to be cognizant about as it does concern some people. I like the way arcuate incisions with the femtosecond look versus what I can do with a diamond, but I'm not yet convinced they result in better outcomes. With the future toric multifocal lenses, what do you think will be the indication for corneal relaxing incisions?

**Dr. Dell:** On the low end of astigmatism it becomes more difficult to precisely find the axis of the astigmatism. If you're off-axis with, say, 3.25 D of astigmatism, you could argue that a big arcuate incision, which is going to flatten a large number of degrees of cornea, may actually be better. Without a precisely aligned toric, you're not going to get the desired results for your patients. I don't think arcuate incisions are going to go away, but we all recognize the accuracy and superiority of torics once you get over around 1 or 1.5 D.

**John A. Vukich, MD:** We used to think steel blades were good until we had diamond blades. Now we think lasers may be best, but I think inherently the biomechanical predictability of the cornea is going to be the limiting factor, and it will always be the rate-limiting factor. Toric lenses are clearly the way to go for higher levels of astigmatism, but femtosecond lasers will likely find a niche for lower levels.

**Dr. Lindstrom:** I can see myself going on to on-axis incisions and toric IOLs, but I see corneal relaxing incision use declining rapidly.

Steven J. Dell, MD

Dr. Dell is director of refractive and corneal surgery at Texan Eye in Austin, Texas, and medical director of Dell Laser Consultants. He can be contacted at steven@dellmd.com.

# Presbyopia correction without compromise: How close are we?

by Steven J. Dell, MD

Our current surgical techniques for the management of presbyopia include 2 good technologies: multifocal and accommodating IOLs. According to the 2014 ASCRS Clinical Survey, presbyopia-correcting IOLs account for only 7.2% of procedures in the U.S. Comparatively, 22% of patients receive monovision.[1] As a group, are we accurately understanding the goals and needs that our patients have? Are we achieving those goals?

The 2014 ASCRS Clinical Survey presented a scenario: If a multifocal IOL patient has no residual refractive error and an excellent ocular surface, what do you think the chances are that they will have functionally significant visual aberrations at night? Both U.S. and non-U.S. surgeons responded similarly—5.7% overall, with slightly more U.S. surgeons believing patients will have functionally significant visual aberrations (6.0%) than non-U.S. surgeons (5.5%).[1] Similar results were found when we asked the question about accommodating IOLs. We asked about the lowest amount of residual astigmatism that's acceptable to leave for these patients. Both U.S. and non-U.S. physicians responded 0.63 D. A growing body of research is demonstrating that the higher the level of residual error, the lower the visual quality, so 0.63 D might not be the benchmark that physicians want to aim for.[2]

Today's patients demand great solutions. For patients, that means clear vision at near, intermediate, and far; no contrast loss; and low/no problems with glare or halos. For physicians, "great" means high patient satisfaction, reliable outcomes, and no significant additional chair time.

Can we achieve those goals with the current or next generation of presbyopia-correcting IOLs? Can we—or how can we—match the risk profile of a monofocal IOL? That's the ultimate goal.

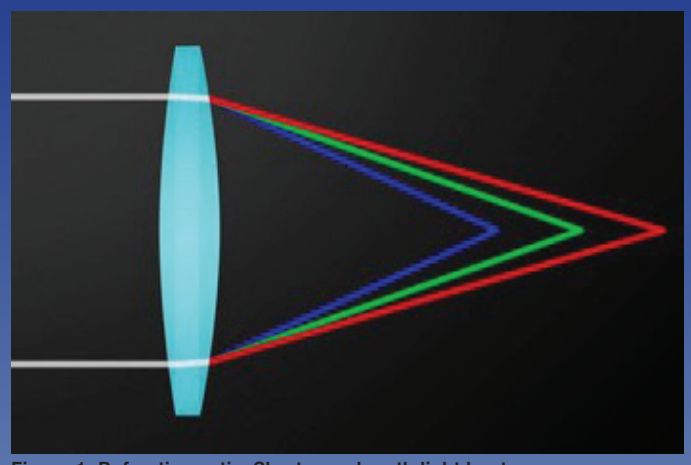

Figure 1. Refractive optic: Short wavelength light bent more

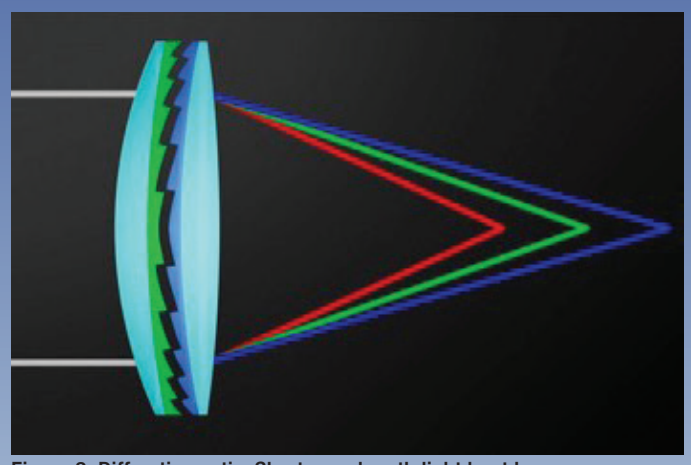

Figure 2. Diffractive optic: Short wavelength light bent less

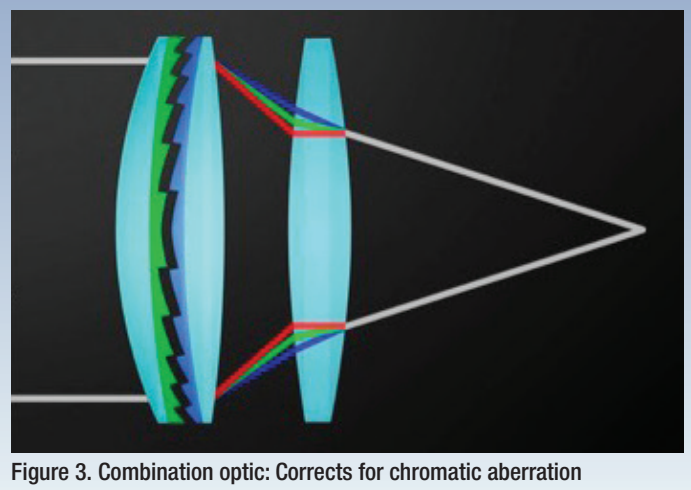

Figure 3. Combination optic: Corrects for chromatic aberration

## Next-generation IOLs

The next generation of presbyopia-correcting IOLs include low power multifocal IOLs that focus on intermediate and distance vision using the same optical concepts as current multifocals. These have the potential for better contrast sensitivity, and they have the potential to be mixed with a high power add in one eye and a lower power add in the other eye.

A new category of PC-IOLs, the so-called expanded elongated depth of focus IOLs, use a different optical strategy. They elongate the focal point as opposed to providing multiple foci. These lenses achieve that without optical compromise. A new PC-IOL, the AcrySof 2.5, directs more of its light energy to distance and less to near, resulting in a lens that's truly designed for intermediate vision. This lens is not available in the U.S., but when evaluating the defocus curve for this lens, the effective add is about 1.75 D compared to about 2.25 D with the ReSTOR 3.0.[3]

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## Extended range of vision

These lenses use 3 principle optical strategies to achieve the increased visual ranges: spherical aberration control; a diffractive optic not to provide multiple foci but to expand the single focal zone; and chromatic aberration control.

Spherical aberration control is the same concept as the negative spherical aberration design cataract surgeons know from the Tecnis platform. This is designed to counterbalance the positive spherical aberration of the cornea. It's been well established over the years. This provides better contrast and better quality of vision.

Diffractive optics on an IOL typically have created a second focal point, as that's how they've traditionally been used. But by modifying the echelettes (the ridges), the lens can be engineered to create a single, elongated focal zone.

Compared to a monofocal IOL, diffractive multifocals have slightly diminished image quality, but it is imperative to know the visual quality with a diffractive multifocal lens relates to the multifocality of the lens, not to the diffractive optic itself. The current iteration of lenses are actually bifocal, not truly multifocal, and that becomes an important differentiation. As a group, we need look no further than professional photographers to learn about optics. One of the most expensive lenses is the Canon EF400F4DO, a lens based on diffractive optics. Photographers use diffractive optics for chromatic aberration control. As light passes through a typical refractive lens, a prismatic effect creates the light dispersion. Chromatic aberration occurs when light gets dispersed owing to the prismatic effect of IOLs. Some wavelengths of light are out of focus. Intraocular lens material properties can contribute to the eye's baseline chromatic aberration. See Figures 1, 2, and 3 for differences between refractive, diffractive, and combination optics.

The Symfony uses all 3 of these features: spherical aberration control, expanded depth of focus with a diffractive optic, and chromatic aberration correction. A study compared the Symfony to a standard Tecnis monofocal IOL, using typical outcome measurements such as defocus, visual quality, patient satisfaction, and spectacle independence. Bilaterally implanted subjects fared much better with the Symfony.[4]

When these patients are in front of a phoropter, even after 6 clicks (1.5 D of over-minusing power) they were still reading at 20/20. Even after 10 clicks patients still read 20/40. That's an extraordinary increase in the range of focus compared to a standard monofocal IOL.

Comparing the Symfony to a standard Tecnis, there's very good uncorrected distance with both lenses and very good best corrected distance with both.[4] But distance-corrected intermediate vision was markedly better with the Symfony, and distance-corrected near vision was 20/30. These outcomes are substantially better than standard IOLs provide.

Perhaps the most interesting finding was that there was no difference in glare or halos compared to a monofocal IOL. There were no spontaneous reports of glare and halo by the 3-month postoperative point, and 97% of the patients would choose the Symfony again.

The new low-powered multifocals will emphasize intermediate and distance vision, and the new extended range of vision IOLs will provide less optical compromise. These are going to be a significant addition to our armamentarium.

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4. Data on file, Abbott Medical Optics.

## *Discussion*

**Dr. Lindstrom:** I'm quite excited about the extended depth of focus lens. I think this might be able to create a new category that I might call premium monovision. Dr. Blecher, is this going to be a whole new opportunity? I usually do plano and –1.50 and while outcomes are acceptable, I personally don't charge patients for doing that.

**Dr. Blecher:** This may give you the opportunity to provide those kinds of premium results to patients who don't have the means to opt for some of our out-of-pocket options. I'm excited that it's not going to be an either/or situation. We're going to have a wider range of lenses for the patients to give them better vision.

**Dr. Lindstrom:** What impact do you think these new technology lenses are going to have on your practice?

**Dr. Dell:** If we can reliably give patients 1.25 D or 1.50 D of additional near assistance without compromising their distance vision, it changes everything. If we use a little bit of defocus on top of that—maybe –0.50 D, –0.75 D of monovision, which most patients are not going to perceive—now we can give them extraordinary near vision. Also, the patients we are disqualifying from a typical multifocal because of other ocular disorders (early age-related macular degeneration) may be appropriate candidates for these lenses.

**Dr. Vukich:** The extended range of vision lenses open up a whole new concept. We've talked about monovision and mini-monovision. I've heard this described as micro-monovision. A 0.50 D of difference between the eyes is tolerated by virtually everyone. Most surgeons don't use monovision for all patients because not everyone can handle it. Somewhere between 1.5 D and 1.75 D is the tipping point, but if we can minimize that to 0.50 D of mini-monovision or micro-monovision I think we've got a really good solution.

Multifocality isn't going to go away, though. Multifocal lenses still provide the best near vision. I agree with Dr. Lindstrom's statement that intermediate is not what drives patient satisfaction, near vision is. That's what will drive patients to choose multifocals.

**Dr. Lindstrom:** Over the years, I've been comfortable doing custom matching—different IOLs in each eye. I've found patients adapt well. I'm interested in what our cumulative experience will be with an extended depth of focus lens in one eye and the near dominant multifocal in the other versus mini-monovision. Are we going to be seeing more dissimilar IOLs in the two eyes?

**Dr. Dell:** I think so. It's an underutilized technique. I think that's a very good strategy to implant expanded depth of focus lenses in the dominant eye and a multifocal in the non-dominant eye. It's going to take us a while to figure that out.

We just evaluated how we schedule our cataract surgery, how patients present, and what we do from there. The overwhelming majority (82%) of my patients are scheduled one eye first, other eye to follow in a planned, sequential, bilateral surgery. We're not waiting a year before scheduling second eye surgery. So it's logical that we can plan a mix and match approach as a natural consequence.

**Dr. Lindstrom:** Yes, I call it "complementary intraocular lenses" when I talk to my patients. They seem to like that term.

John Vukich, MD

Dr. Vukich is a partner at the Davis Duehr Dean Center for Refractive Surgery, Madison, Wis. He can be contacted at javukich@facstaff.wisc.edu.

# Laser vision correction today: Expectations beyond 20/20

by John Vukich, MD

With the introduction of femtosecond lasers for cataract surgery and the newer technology IOLs, cataract surgery has become a refractive surgical procedure. Our patients judge the quality of their surgery by their postop refractive error. Laser vision correction (LVC) is emerging as a technique with two distinct, unique patient groups: our traditional virgin eyes that need myopic or hyperopic correction, and now cataract patients who want a touch-up to meet their vision goals/expectations.

LVC can optimize outcomes by minimizing postop cylinder. What is the effect of residual cylinder on our premium lens patients? The 2014 ASCRS Clinical Survey found most respondents believe 0.63 D of residual cylinder is visually significant, but levels lower than that are acceptable.[1] Data from Optical Express is emerging that shows we may need to be more diligent than we have been about residual cylinder and lower levels of astigmatism. Data was presented at the 2014 Combined Ophthalmic Symposium on 4,970 consecutive refractive lens exchange eyes (2,485 patients) who had bilateral procedures (with a week in between surgeries). All patients received multifocal IOLs, and all underwent surgery between June 2010 and December 2012 at Optical Express sites throughout Europe. Because of the large numbers, almost every typical endpoint resulted in statistical significance, but we must discern what is then clinically relevant.

Baseline demographic data was to be expected: mean age was 57.7±7.5 years, 52% were female, 16% were myopic, and the average preop refractive error was –3.89 ±2.97 D for myopes and +2.36±1.68 D for hyperopes. Average preop cylinder was –0.61±0.59 D.

Patient questionnaires distributed at 1 month postop determined 94.1% of patients were either satisfied or very satisfied with their outcomes.

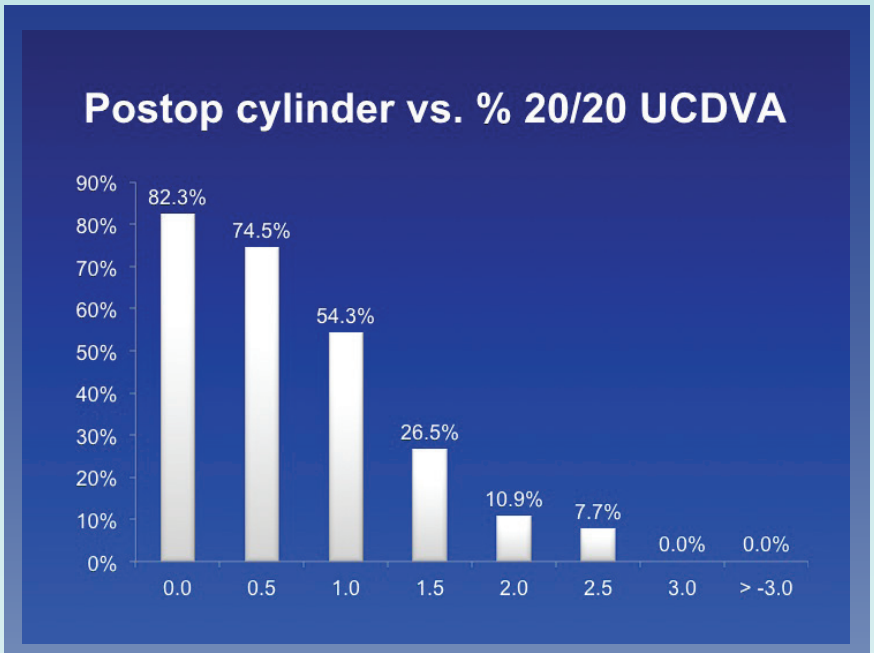


Figure 1. Postop cylinder and percentage of patients with 20/20 uncorrected distance visual acuity

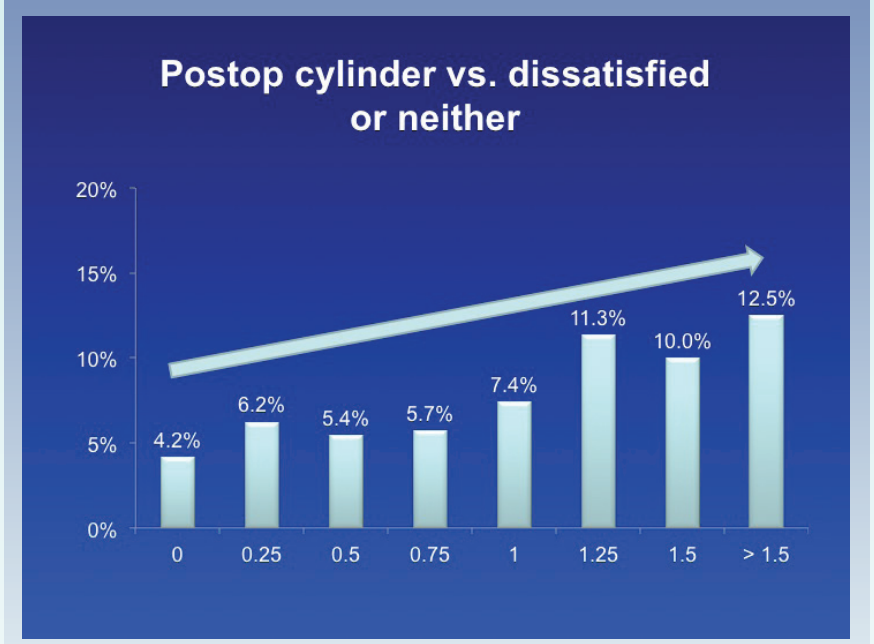


Figure 2. Postop cylinder and correlation to percentage of neutral or dissatisfied patients

Source: Steve Schallhorn, MD, presented at ASCRS 2013, courtesy of Optical Express

While those numbers are encouraging, what is disheartening is the 4% who are neutral about their procedure—after spending additional money to undergo the surgery. And 1.6% is dissatisfied. Almost 1 of every 18 patients is unhappy, and that's an issue. It may be our limiting factor to further market penetration with multifocal lenses.

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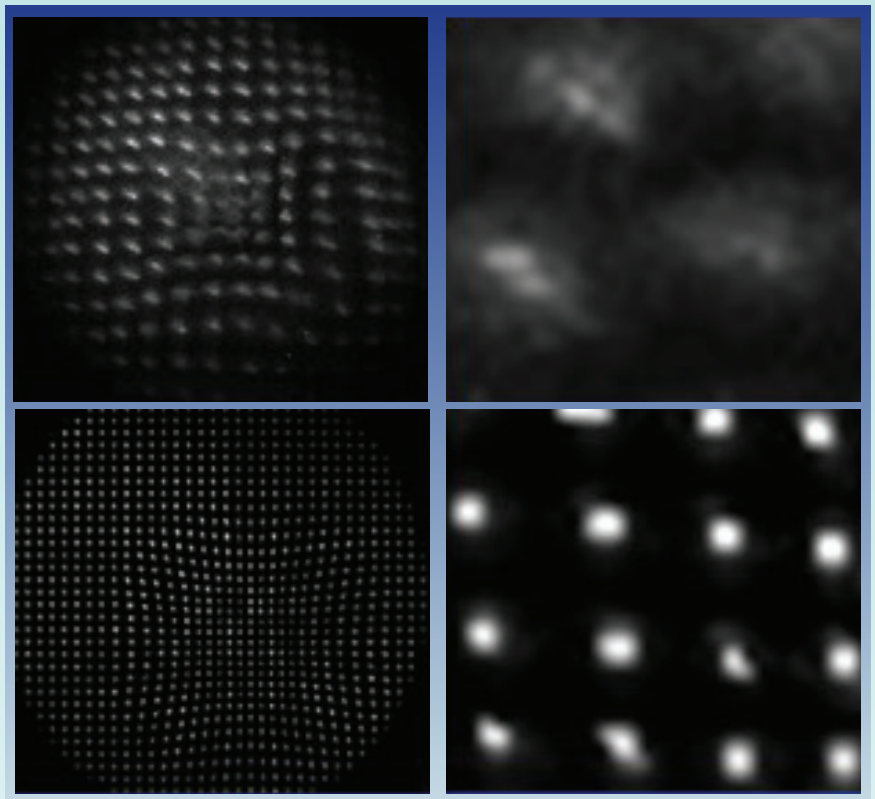

Figure 3. Advanced wavefront-guided topography images

Source: J. Vukich, MD

It is what makes some surgeons forego the technology altogether rather than have unhappy patients postop.

## Determining patient happiness

There is a direct correlation between postop cylinder and percentage of patients with 20/20 uncorrected distance visual acuity (UCDVA). See Figure 1.

What this data shows is a rather precipitous drop in 20/20 UCDVA. With only 0.5 D of residual cylinder, almost 25% of patients are not at 20/20. By 1.0 D of residual cylinder, almost half are not at 20/20. This is amplified substantially in the multifocal patient. This also correlates to patient (dis)satisfaction. With no postop cylinder, 73.2% of patients are very satisfied, but almost 30% are unhappy with 0.5 D of postop cylinder, and 33% are unhappy with 1.0 D of residual postop cylinder. For practices that have implemented patient-reported outcomes, it is unacceptable for patients to be anything aside from "very satisfied."

Figure 2 illustrates the responses from patients who are neither satisfied nor dissatisfied. As with the satisfied group, increasing postop cylinder amounts correlate with increased dissatisfaction.

Of interest, however, was the finding that postop cylinder does not necessarily correlate with postop glare or halo. Regardless of postop cylinder amounts, somewhere between 25% and 36% of patients have glare or halo.

## Improving outcomes

Even 0.50 D of postoperative astigmatism lessens your chance of achieving 20/20, and it reduces satisfaction. We need to improve outcomes to improve satisfaction, and we need to evaluate advanced LVC modalities to achieve those improved outcomes.

The 2014 ASCRS Clinical Survey found 84% of respondents use 20/20 uncorrected acuity as a baseline for successful surgery, but do not have a way to assess successful LVC outcomes.

Our practice has not increased its advertising budget, but we are able to reach more potential patients. Today's instant communication via social media has expedited our decision to reduce our advertising spends while increasing our patient satisfaction rates and leveraging that. Our technology is, in fact, our advertising.

Optical Express has coined the term "patient ambassador," generally translated as a patient who refers someone who then has surgery. The key for our practices is to identify these ambassadors. Optical Express has more than 200,000 patients in its database. The better a patient's postop vision, the more likely he/she was to refer someone: 90% of patients who were super-ambassadors (more than 1 referral) were 20/20 and of that, 73% were 20/16 or better. By achieving a good result, word-of-mouth referrals will expand a practice's patient base.

At 1 month postop, almost 16% of multifocal IOL patients who achieved 20/12 or 20/16 were ambassadors. But for patients with 20/25 outcomes, only 10% were ambassadors. Translation: 20/25 postop results are no longer "good enough" to get multiple referrals.

Surgeon care does play a role. Surgeons who provide outstanding results, do not have long wait times, and see patients at times convenient for the patient will have satisfied patients. But the high quality of vision is really an important factor.

## Technology on the horizon

Technology is improving. We currently use conventional, optimized, and wavefront-guided LVC. The next generation will include topography-guided and advanced wavefront-guided. We're seeing incremental but substantive improvements in both of these platforms.

Topography-guided ablations provide an improved ablation profile based on corneal shape. By adjusting the postop corneal asphericity, the WaveLight Allegretto addresses corneal aberrations exclusively. This technology has improved dramatically and has potential benefits for post-cataract cases. It can treat primary eyes and therapeutic cases (keratoconus). It's particularly well suited for treatment on previously operated symptomatic eyes.

In primary myopia, topography-guided results were excellent: 92.7% were 20/20 UCVA, 68.8% were 20/16 UCVA, and 30% gained 1 line above BCVA. Most impressive, however, is that 98% would have the surgery again.

Advanced wavefront-guided treats entire eye aberrations while minimizing patient accommodation. This new technology increases the resolution substantially (see Figure 3), allowing us to capture nearly every eye.

Using the iDesign LASIK we evaluated data from 8,905 eyes (4,721 patients) that underwent surgery between May 2012 and August 2013. At 1 month, the majority of patients are close to intended refractive correction (cylinder).

This is a very good technology. In fact, the R2 of 0.92 is really good. Visual outcomes are equally impressive, with 84% at 20/16 and 95% at 20/20.

Technologies like these coupled with increasing patient demands for exceptional vision mean Snellen acuity of 20/20 is no longer the gold standard. As surgeons we need to go beyond that to ensure patient satisfaction and, therefore, practice longevity.

**Reference**

1. ASCRS Clinical Survey 2014. Global Trends in Ophthalmology. Fairfax, VA: American Society of Cataract & Refractive Surgery, 2014.

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## *CME questions (Circle the correct answer)*

**1. A poorly centered capsule can result in:**

a. A retinal tear
b. Malpositioned haptic
c. Double vision
d. None of the above

**2. According to Dr. Blecher, laser-assisted cataract surgery:**

a. Has limited peer-review published literature on the technology, with less than 50 papers written on the subject
b. May improve capsulorhexis creation and therefore lens centration, as well as arcuate incisions and lens fragmentation
c. Is not as reliable as diamond blades
d. Is not recommended for treating lower levels of astigmatism

**3. According to the 2014 ASCRS Clinical Survey:**

a. 34.9% of ASCRS members do not believe there is enough data showing the benefits of LACS vs. conventional cataract surgery
b. Almost 64% of respondents define LVC "success" as the percentage of patients with 20/20
c. 7.2% of patients receive presbyopia-correcting IOLs
d. All of the above

**4. Elongated depth of focus IOLs**

a. Provide multiple foci
b. Direct more of their light energy to near vision
c. Create an effective add of about 3.0 D
d. Lengthen the focal point

**5. Post-laser vision correction, how does residual cylinder affect uncorrected distance visual acuity outcomes?**

a. At 0.5 D of residual cylinder, almost 25% of patients are not at 20/20
b. At 1.0 D of residual cylinder, almost 35% of patients are not at 20/20
c. At 1.5 D of residual cylinder, 50% of patients are not at 20/20
d. At 2.0 D of residual cylinder, 50% of patients are not at 20/20

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