



Bonnie An Henderson, MD

Young eye surgeons start out with limited premium technology experience

by Bonnie An Henderson, MD

We know that barriers to performing laser-assisted cataract surgery (LACS) exist across age groups, with financial concerns and lack of access to the technology leading the list of reasons why surgeons haven't yet performed LACS.

Each of these technologies can be beneficial to patient care. Moreover, as concerns about the future of Medicare reimbursement rise, they may also be critical to maintaining a healthy practice.

In this supplement we share advice from successful young physicians on how to launch an advanced technology practice, as well as some great toric, multifocal, and accommodating IOL cases and discussion around how to succeed with these IOLs in clinical practice.

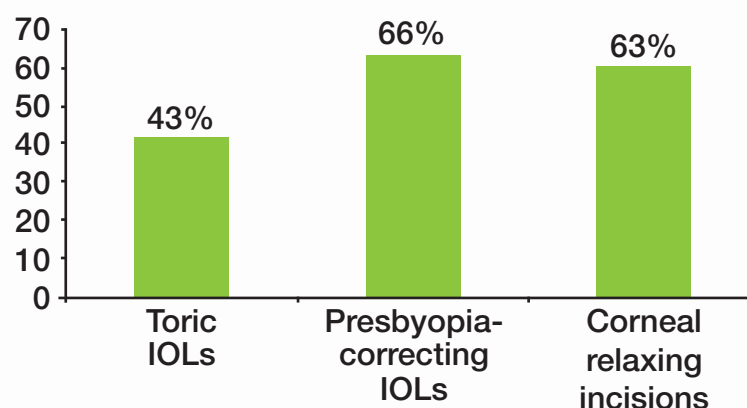
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We know that gaining access to and experience with advanced technology can be challenging for young ophthalmologists, the majority of whom say their exposure to premium technology in residency is inadequate. According to the 2014 ASCRS Clinical Survey, two-thirds (63%) of those in residency, fellowship or their first 5 years in practice say they had no formal refractive surgery training during residency.

Experience with premium IOLs and corneal relaxing incisions is also very limited, with most young ophthalmologists saying they have performed 5 or fewer cases (Figure 1).

Young Physicians: Premium IOLs and CRIs

Experience with this technology is limited to <5 cases



Most young physicians surveyed have implanted 5 or fewer premium IOLs

Figure 1: According to the 2014 ASCRS Clinical Survey, most young physicians have limited experience with LRIs and toric and presbyopia-correcting IOLs.

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Educational Objectives

Ophthalmologists who participate in this activity will:

- Establish protocols for exposing young ophthalmologists to LACS and identify the clinical benefits and practice implications of the growing use of femtosecond laser assistance in cataract surgery;
- Recognize the visual quality performance of premium IOLs, particularly with advanced presbyopia-correcting and toric IOLs, with regard to both clinical outcomes and practice performance and the importance of incorporating these technologies for new and established refractive cataract practices; and
- Describe the latest evolutions in refractive surgery as a new paradigm for ophthalmologists and the benefits and implications this technology has for patient care and establishing a modern cataract and refractive practice.

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Elizabeth Yeu, MD

Building a premium technology practice

by Elizabeth Yeu, MD

the promise of spectacle independence. To offer them successfully, you have to believe in the value of spectacle independence for patients' lifestyles.

When patients are paying out of pocket, make sure they enjoy a premium experience in your practice. An enthusiastic and educated team is key, and I found that I need to schedule differently so that my staff and I can "stay in the zone" with cataract consults instead of rushing through them. Consolidating my cataract evaluations to one day helped me grow my refractive cataract surgery conversion rate from about 35% in 2013 to 55% in 2014. Offering financing and incorporating a team of concierge staffers to greet and escort patients can also be beneficial.

Capital equipment investments

The more advanced technology IOLs you perform, the more you will realize that other technologies, such as advanced topography/tomography, surgical guidance/intraoperative aberrometry systems, and lasers, can contribute to improving results.

Your biggest debate will likely be whether and when to acquire a femtosecond laser for cataract surgery. It's a big-ticket investment, but one that can also make a big difference in outcomes and word-of-mouth referrals. For our practice, it helped to grow the share of premium procedures, tripled our non-insurance-based cataract revenue, and significantly increased overall cataract surgery volume (Figure 2).

Success builds on itself. Ultimately, a larger advanced technology IOL case volume will provide the confidence and the revenue necessary to support further technology acquisition to continue to improve outcomes and differentiate your practice.

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Young surgeons will find that building a cataract practice based on advanced technology and a premium patient experience can be professionally and financially satisfying (Figure 1). But it can also be daunting to know where to start and how to incorporate new technologies in a smart way. The first step doesn't cost a penny: Commit to achieving the best possible refractive outcomes. With that as a guiding principle, start implanting toric IOLs as a first step, add presbyopia-correcting IOLs, then explore the value of making major capital equipment investments.

Start with torics

Of all the premium technologies, toric IOLs are the low-hanging fruit. Astigmats, with their lifelong dependence on vision correction, can be among your happiest patients. There are a lot of them (about one-third of patients have >1.0 D of corneal astigmatism), and the technology to satisfy their distance vision needs is excellent.

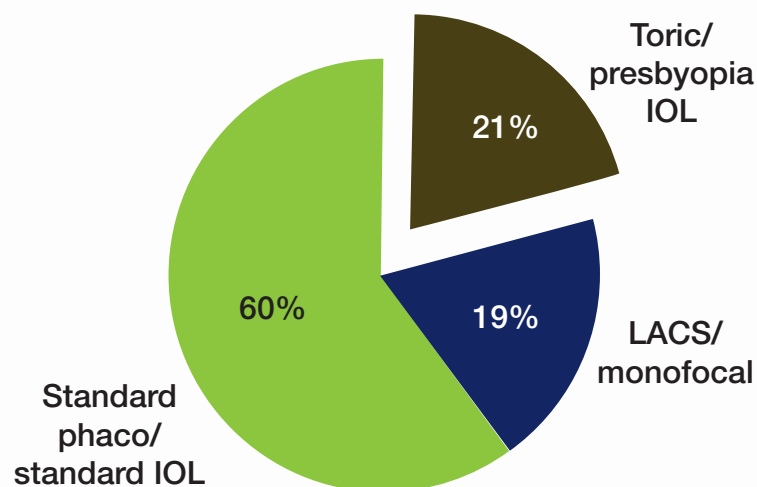
Initially, focus on easier cases, including those with: regular, stable astigmatism; moderate astigmatism (1.0–3.0 D); average axial length (22.0–25.5 mm); good zonular and capsular support; and a healthy cornea and retina.

Clinically, you have to have excellent technique, an understanding of your surgically induced astigmatism (sia-calculator.com), and pay close attention to the ocular surface to ensure that your measurements are accurate. Also, utilize diagnostic tools that you trust to confirm the axis and amount of astigmatism.

Presbyopia-correcting IOLs

Contemporary presbyopia-correcting IOLs can deliver on

2014 VEC premium procedure revenue



Premium revenue	
LACS with toric/presbyopia IOL	\$2,013,955
LACS/monofocal	\$1,156,375
Standard phaco/standard IOL	\$0

Figure 1: In 2014, refractive cataract surgery with femtosecond laser and/or a premium IOL contributed more than \$3 million in additional practice revenue.

Femtosecond laser helped grow cataract surgery volume overall

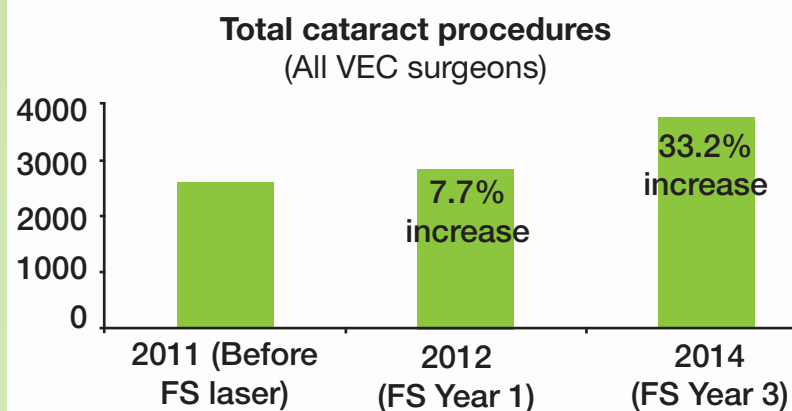


Figure 2: With the acquisition of a femtosecond laser, overall cataract volume increased due to increased referrals.



John Berdahl, MD

Minimizing residual astigmatism is critical to obtaining optimal results with premium intraocular lenses

Premium intraocular lenses (IOLs) enable us to offer a range of options to fit our patients' lifestyles, and toric IOLs are an excellent way to enter the premium IOL field. However, to achieve optimal outcomes that will meet patients' needs, it is important to know how to prevent postoperative residual astigmatism and correct it if it occurs.

Case report

A patient had 3.5 D of astigmatism one week after implantation of an Acrysof Toric T9 IOL. The surgery corrected approximately 0.5 D of her 4.0 D of astigmatism—not the expected correction for this reliable toric lens.

I entered her manifest reaction, toric IOL, and current axis into the

Succeeding with toric IOLs

by John Berdahl, MD

Toric Results Analyzer (astigmatismfix.com), which David Hardten, MD, and I developed. This free tool helps surgeons determine whether rotating the IOL will correct the problem.

The IOL had rotated approximately 30 degrees from where I intended to place it.

I performed intraoperative wavefront aberrometry. We rotated the IOL 28 degrees, as recommended by the astigmatismfix.com calculator. It was only one week after the initial surgery, so the haptics had not fused into the posterior capsule. We need to be sure the haptics are freed from the sulcus of the capsule. I placed viscoelastic on top of the IOL to loosen it, and after rotating the IOL, I removed the viscoelastic.

When we repeated intraoperative aberrometry, astigmatism decreased from 3.15 to 0.43 D. The next day, the patient's visual acuity was 20/20 and she was pleased with her vision (Figure 1).

Targeting the root cause

There are a number of potential reasons for residual astigmatism after implantation of a toric IOL, including ocular surface disease, anterior basement membrane disease, or irregular astigmatism. We need to treat disease that is present and, ideally, not place the lens in such an eye.

“It is important to know how to prevent postoperative residual astigmatism and correct it if it occurs.”

—John Berdahl, MD

The IOL may be in the incorrect location or we may have used the wrong lens power because preop measurements and calculations were inaccurate. We also need to account for cyclorotation, performing preoperative marking with the patient in the upright position. A surprising surgically induced astigmatism or posterior corneal curvature is often the cause of residual astigmatism.

I perform a topography measurement and use it to determine the axis in my calculator. Then I use the Ks from LENSTAR or IOLMaster to determine the magnitude of the astigmatism. We need to be sure the Ks from different sources are consistent.

Finally, the IOL may have rotated or been placed incorrectly. For every degree the lens is misaligned,

we lose 3.3% of the toric IOL power (Figure 2). Intraoperative aberrometry is important, and I recommend considering intraoperative alignment technologies.

From our website, we have found that preoperative biometry was not adequate in 76% of cases of residual astigmatism. In addition, 70% of the time the IOL rotated and in 52% of cases, residual astigmatism resulted from a combination of the two.

Surgeons also need to know their surgically induced astigmatism and how it affects the axis. In addition, in approximately 80% of cases there is against-the-rule astigmatism on the posterior cornea, and in roughly 15% of cases with-the-rule astigmatism is present.

continued on page 134

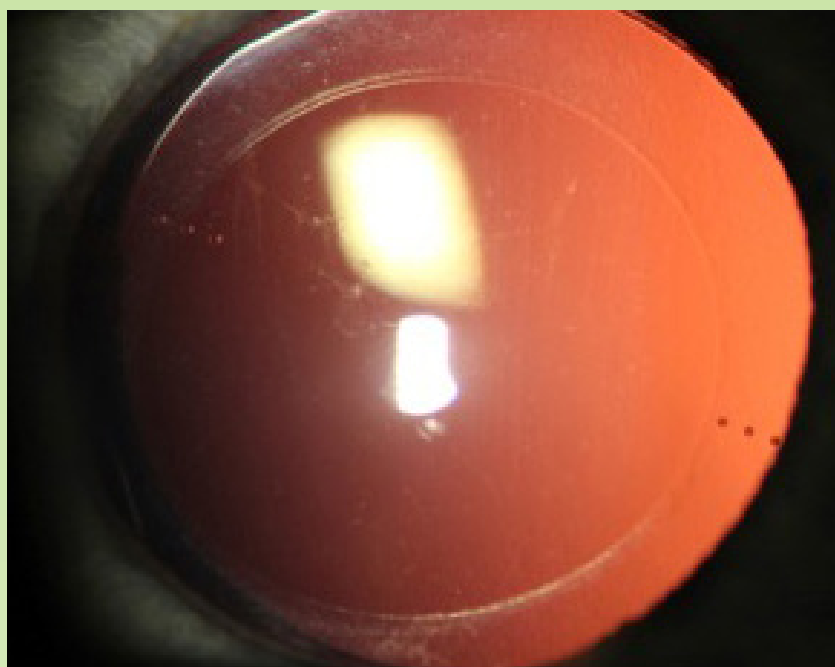


Figure 1. Before (left) ($-1.75 + 3.50 \times 92$; VAsc 20/70) and after (right) (plano; VAsc 20/20) rotation of a toric T9 IOL



Sumit (Sam) Garg, MD

Careful patient selection, a comprehensive preop examination, and precise intraoperative and postop strategies are key to patient satisfaction

Multifocal intraocular lenses (IOLs) are an attractive option for patients seeking presbyopia correction. To deliver the results patients expect, meticulous preoperative, intraoperative, and postoperative management are key.

Case report

Cataract reduced vision in a 78-year-old man, with glare impeding his ability to drive at night. His manifest refraction was $-0.75\text{ D} +1.75\text{ D} \times 005$, and his best corrected vision was 20/50 (glare 20/100). His average axial length and keratometry on the IOLMaster were consistent with the manifest refraction.

I implanted a Tecnis ZKB00 multifocal IOL (+21.0 +2.75 add). I confirmed my IOL selection using the Barrett Universal II formula (www.apacrs.org/barrett_universal2). My goal was to leave the patient slightly myopic (-0.10 D).

Discussion

During the preoperative evaluation, I ask patients to rate themselves on a scale ranging from “easy going” to “perfectionist.” For those just beginning to implant presbyopia-correcting IOLs, I don’t recommend starting with candidates who consider themselves perfectionists.

Patients need to have realistic goals and expectations. I emphasize that multifocal IOLs reduce dependence on glasses and they may need glasses in certain situations. They need to know that no IOL is perfect.

Succeeding with multifocal IOLs

by Sumit (Sam) Garg, MD

I under promise and try to over deliver.

The questionnaire and slit lamp examination are important components of a comprehensive examination. In my opinion, patients should have no ophthalmic comorbidities that could degrade visual quality with their new IOL. If they do have early signs of pathology, I make sure they are aware that if the condition worsens, a multifocal IOL may degrade their vision disproportionately.

I perform diagnostic testing on multiple devices with the hopes that the measurements agree and are reproducible. If disparities occur, I try to determine why.

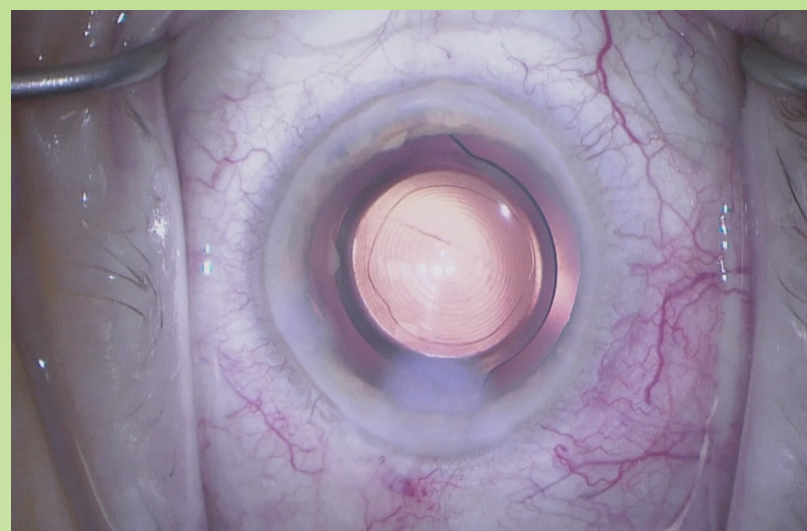
I use a pinhole test for near vision, with a very bright light to determine visual potential in patients with moderate to advanced cataracts. If they don’t achieve J1 or J1+, I explore possible etiologies for decreased potential vision. For all multifocal patients, I perform biometry, topography, and OPD-Scan III, which provides angle kappa, spherical aberration, and point-spread functions. If angle kappa is higher than 0.45 D, the surgeon may not want to implant a multifocal IOL because the patient’s line of sight may not line up with the optics of the multifocal, thereby degrading vision.

I also perform tomography (Pentacam) to help determine total corneal refractive power. This helps me determine the need for astigmatic correction. Additionally, if there is any indication that the patient’s visual potential is not perfect, it is useful to perform optical coherence tomography (OCT) of the macula.

If ocular surface disease (OSD) is present, I aggressively treat the patient before implanting any IOL because I think that OSD not only affects preoperative testing, but postoperative performance of the IOL as well. Treatments for OSD must be individualized to each patient, and point-of-care testing can be helpful. Patients must understand that dry eye is chronic; it takes a long time to emerge and does not have a quick fix. After treatment, it’s important to recheck the patient’s measurements before surgery.

“Patients have high expectations of premium IOLs, and surgeons must ensure that they are appropriate candidates.”

—Sumit (Sam) Garg, MD



Note centration of IOL on axial and paraxial lights from operating microscope

Astigmatism can be corrected with on-axis incisions or limbal relaxing incisions. The surgeon must be sure the capsulorhexis overlaps 360 degrees. Intraoperative aberrometry is a useful tool during surgery.

Intraoperatively, surgeons also should assure IOL centration and rule out zonulopathy. If zonulopathy is present, surgeons may want to use a capsular tension ring. In addition, all OVD must be removed from behind the IOL.

When centering a multifocal IOL, the subject-fixated, coaxially sighted corneal light reflex is a useful centration point (Figure 1).¹

One week after surgery, if the patient’s vision misses the target, the first step is to examine the manifest refraction. The surgeon will need to determine whether glasses, an IOL exchange, laser vision correction, or limbal

relaxing incisions will provide the best outcome. Astigmatismfix.com is a valuable tool in this process.

Patients have high expectations of premium IOLs, and surgeons must ensure that they are appropriate candidates and take steps preoperatively, intraoperatively, and postoperatively to achieve optimal results.

Reference

1. Chang DH, Waring GO 4th. The subject-fixated coaxially sighted corneal light reflex: a clinical marker for centration of refractive treatments and devices. *Am J Ophthalmol.* 2014;158:863–874.

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Kendall E. Donaldson, MD, MS

Succeeding with accommodating IOLs

by Kendall E. Donaldson, MD, MS

He played golf and tennis, enjoyed going out at night, and was not willing to tolerate glare or halo. We wanted to ensure the technology we chose fit his lifestyle long term.

We implanted the Crystalens in his non-dominant eye, selecting a slightly myopic target, and he is very pleased. He wears reading glasses at his desk at work but is completely spectacle independent on weekends.

Accommodative technology

Accommodating technology is particularly useful for several groups of patients who might not be appropriate candidates for other presbyopia-correcting IOLs. For example, guttata can affect vision in patients with mild Fuchs' dystrophy even if they do not have corneal edema.

It can also be useful in patients with anterior basement membrane disease if irregular astigmatism is not severe or in those with mild macular pathology where the potential acuity meter or potential acuity pinhole shows good visual potential.

Some questions remain with accommodative IOLs. For example, OCT has shown that the optic of accommodative IOLs most likely shifts forward approximately 1 D, and we

Counseling presbyopia-correcting IOL patients

To set reasonable expectations, take care to advise patients about the potential for:

- Glare/halos (multifocals)
- Light dependency at near (some multifocals)
- Limitations in intermediate vision (some multifocals) or near vision (accommodating)
- One eye will be stronger for distance and one stronger for near, if monovision or mini-monovision is planned; emphasize using both eyes together

do not achieve full accommodation. We also need to consider where the lens will sit and how predictable it is.

We began using the Trulign toric IOL approximately one year ago, combining accommodation with astigmatism correction, which has

Accommodative IOLs extend presbyopia correction options to a broader range of patients

Ophthalmologists can turn to an increasingly broad array of intraocular lenses (IOLs) to correct presbyopia, and accommodative IOLs offer opportunities for patients who may not be suitable candidates for multifocal IOLs.

Case report

A 66-year-old attorney complained of blurred vision and was highly motivated to have presbyopia correction. A very athletic, active person, he had worn monovision contact lenses previously. His best corrected visual acuity was 20/40 (dominant) and 20/30, and his intraocular pressures were normal.

continued from page 132

Correcting the problem

To correct postoperative residual astigmatism, I measure the manifest refraction. Next, I measure the IOL axis and know its toricity. We plug this information into astigmatism-fix.com.

I rotate the IOL if astigmatism can be neutralized and the spherical equivalent is near target. I mark the current and ideal axis, loosen the IOL with viscoelastic, rotate the IOL, and remove the viscoelastic.

Laser vision correction is recommended when the spherical equivalent is not at target, astigmatism is not neutralizable, or the IOL cannot be rotated easily.

Significant residual astigmatism is uncommon, but we need to know how to prevent it and establish a plan to correct it if necessary. This will become increasingly important

Misalignment	% loss	Absolute loss	
		T3 (1.03 D)	T9 (4.11 D)
0 degrees	0%	0 D	0 D
5 degrees	17.5%	0.18 D	0.71 D
10 degrees	35%	0.36 D	1.43 D
15 degrees	50%	0.51 D	2.05 D
30 degrees	100%	1.03 D	4.11 D

Figure 2. Vision loss as a result of IOL misalignment

when we use toric multifocal IOLs, which are very sensitive to residual astigmatism.

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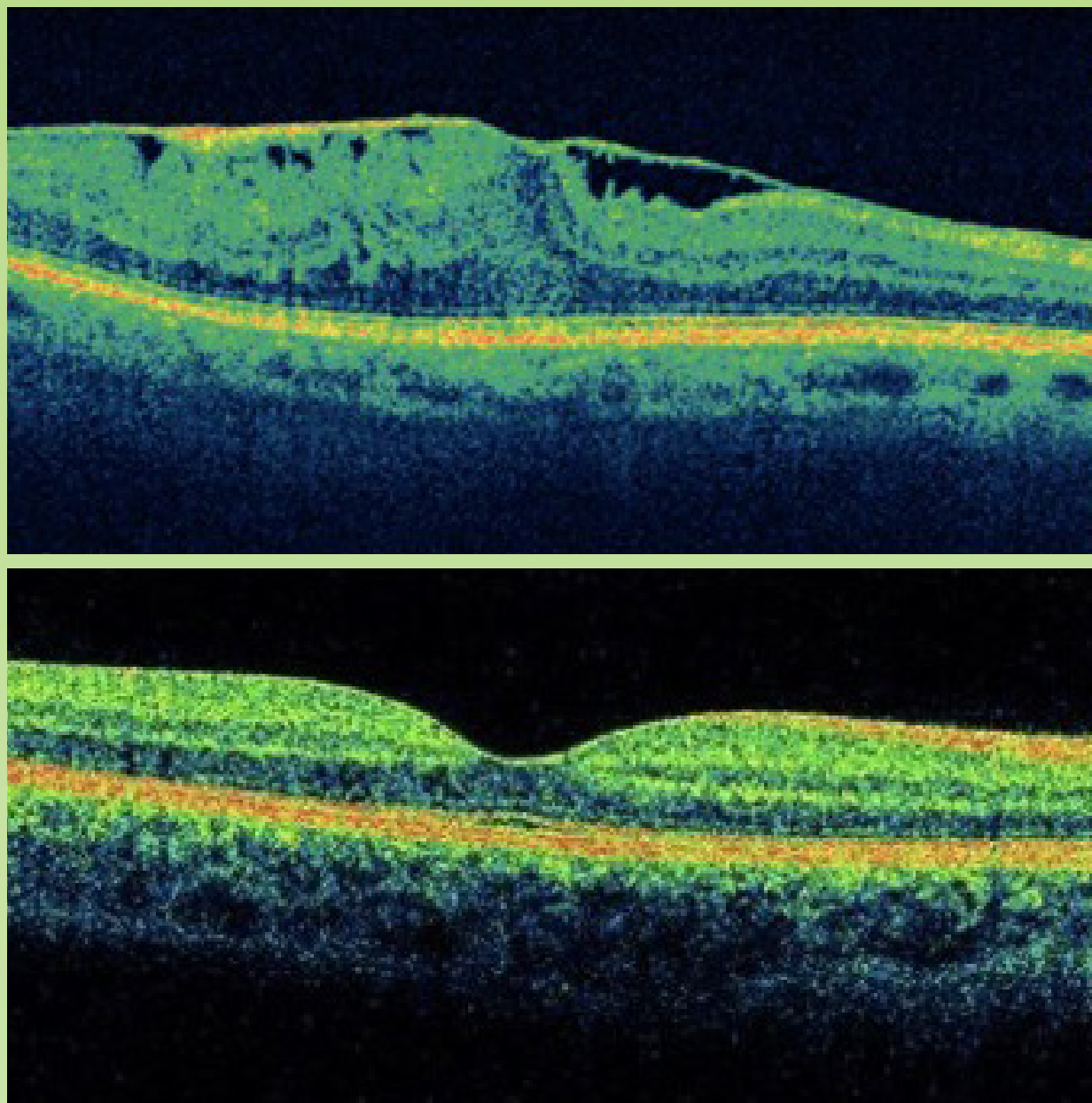


Figure 1. Corneal topography and OCT should be performed on all premium IOL candidates. In patients with macular pathology, as shown here, an accommodating IOL would be a better choice than a multifocal IOL.

“Accommodating lenses allow us to correct presbyopia in a broader range of patients.”

—Kendall E. Donaldson, MD, MS

opened new possibilities. Because patients do not have full accommodation with these IOLs, we focus the non-dominant eye with slight myopia to help expand the patient's range of vision.

Preoperative examination

During the preoperative examination we provide a questionnaire asking patients about their hobbies and

occupations. Using a questionnaire increases efficiency.

Topography and optical coherence tomography (OCT) should be performed in all premium lens candidates (Figure 1). We must diagnose and treat preexisting conditions. For example, when examining candidates for accommodating IOLs, it is important to be alert for pseudoexfoliation syndrome.

With the Trulign lens, I create an approximately 5.0- to 6.0-mm capsulotomy. I always use intraoperative wavefront aberrometry to align the lens and make sure the wound is tightly closed, possibly using a suture. We also need to follow our results and revise our nomograms as needed.

If we have not reached our refractive target after surgery, I use the Toric Results Analyzer (astigmatismfix.com) to determine the best course of action. We can perform enhancements with laser vision correction if necessary.

Z syndrome may occur in rare cases with accommodating IOLs, which may need to be corrected with a posterior or anterior YAG. If explantation is necessary, it may be challenging.

Many baby boomers are high functioning and know a great deal about lens technology. We speak with them honestly about compromises they might need to make and what they will achieve with these IOLs (see box). We are alert for type A patients who are unwilling to compromise or accept some potential side effects.

Accommodating lenses allow us to correct presbyopia in a broader range of patients, particularly if they are not good candidates for multifocal IOLs. To achieve patient satisfaction with accommodating IOLs, it is important to communicate with patients before surgery and ensure that their goals are realistic.

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William B. Trattler, MD

Strategies for bringing in capital equipment to improve patient care

From femtosecond lasers to excimer lasers, surgeons want the best premium technologies for their patients. However, young surgeons often encounter what can feel like insurmountable obstacles to access, such as not having enough influence over capital equipment decisions, not having the surgery volume to justify a major acquisition, or simply not having experience with the technology. Thankfully, there are ways to overcome each of these obstacles.

Expand your influence

Even as a minority owner or non-ASC owner, surgeons often have more power than they think. Surgery centers bring in revenues by having a large volume of cases—and they don't want to lose the business of successful young surgeons. To convince decision makers, be passionate about the impact of a new technology on patient care, and come to the table with ammunition on costs as well as how bringing a specific volume of surgical cases to the ASC will help offset these costs.

For example, I'm a 1% owner at my surgery center, but I was able to make the case that a femtosecond laser could attract more surgeons to use the center. With more surgical cases at the center, the costs of the laser would be covered. And in fact, once we brought in the femtosecond laser, the additional volume of surgical procedures did help cover the costs of the laser so that we could provide a technology to help improve surgical outcomes for the patients who have surgery at our center (Figure 1).

Overcoming obstacles to new technology acquisition

by William B. Trattler, MD

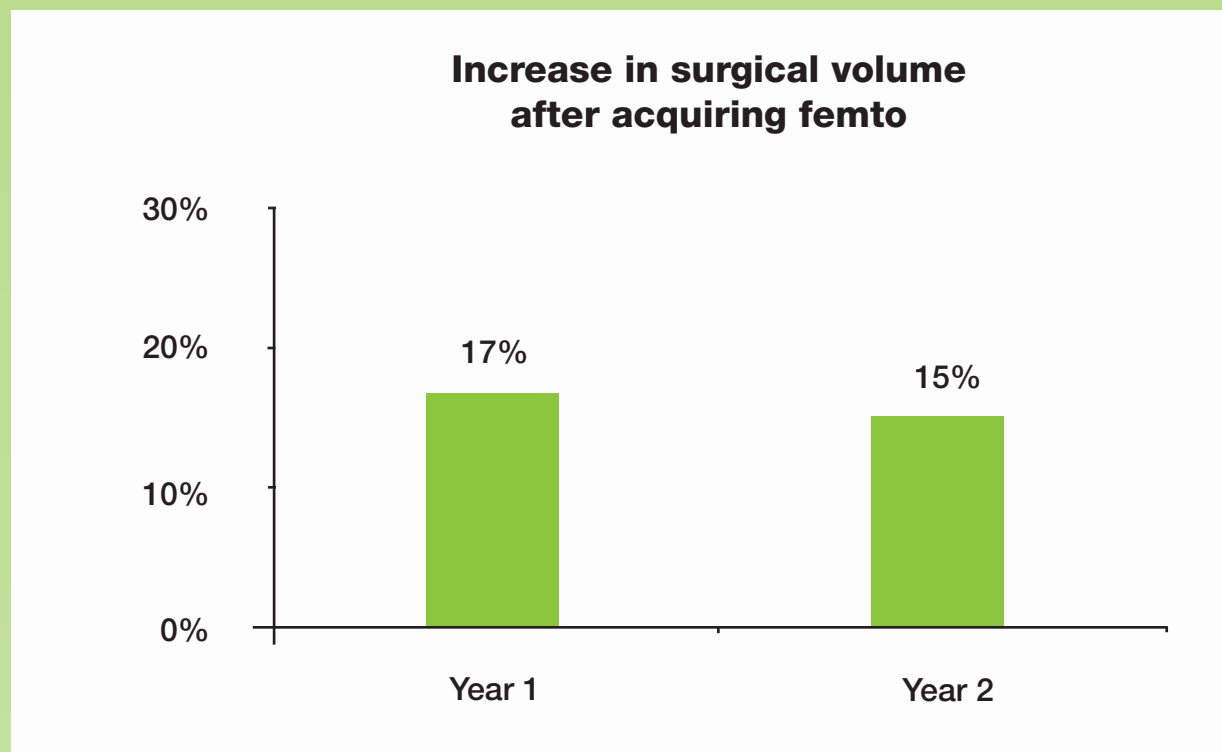


Figure 1: Adding a femtosecond laser to our surgery center led to an increase in overall cataract surgery volume by 17% in the first year and 15% in the second, due to strong interest from community physicians to have access to the technology.

Complacent partners who have no interest in updating clinical technology can be a challenge—one best addressed before joining a practice. Be proactive in finding out what technology is currently in place, what technology acquisition plans have been made, and what the partners' innovation and investment philosophy is.

Which comes first—the volume or the purchase?

If you don't have the case load to support purchasing a particular new technology right away, consider doing a roll-on roll-off (RORO) arrangement, which lets the technology come to you for as little as 1 day per month. We did this for 6 years with an SLT laser for glaucoma, until we had built up the glaucoma case volume to buy our own laser.

Open access centers are another good option, even if you are a part-owner in a different center. There is nothing wrong with bringing patients to a center that is a little distance away to get access to a technology that will benefit them.

“Finding a way to afford the latest devices is always a balancing act, but it's one worth mastering.”

—William B. Trattler, MD

Young surgeons sometimes feel that they are at a disadvantage compared to their more experienced colleagues, but I would suggest that we are all learning constantly. Much of what I do now I didn't learn in residency. Take advantage of mentors in your community and go through manufacturer training and certification programs so that you are ready to use new technology as soon as you can gain access to it. Online videos and courses are also an excellent resource for staying abreast of new techniques and technology.

Finding a way to afford the latest devices is always a balancing act, but it's one worth mastering. New technology makes us better surgeons and helps us achieve the best outcomes for patients.

Dr. Trattler is director of the Center for Excellence in Eye Care, Miami, and is on the volunteer faculty at the Florida International University Herbert Wertheim College of Medicine, Miami. He can be contacted at 305-598-2020 or wtrattler@gmail.com.

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CME questions (circle the correct answer)

1. **For surgeons interested in launching an advanced technology practice, Dr. Yeu recommends starting with what?**
 - a. Intraoperative aberrometry
 - b. Femtosecond laser
 - c. Presbyopia-correcting IOLs
 - d. Toric IOLs

2. **How much of the correction of a T9 (4.11 D) toric IOL will be lost if the lens is misaligned by 10 degrees?**
 - a. 0.71 D
 - b. 1.43 D
 - c. 2.05 D
 - d. 4.11 D

3. **What does Dr. Garg recommend using for centration of a multifocal IOL?**
 - a. Center of the entrance pupil
 - b. Center of the cornea
 - c. Subject-fixated, coaxially sighted corneal light reflex
 - d. The brightest Purkinje reflection

4. **Accommodating IOLs may be an ideal choice for patients with:**
 - a. Guttata or anterior basement membrane disease
 - b. High expectations for uncorrected near vision
 - c. Pseudoexfoliation syndrome
 - d. Extremely dry eyes

5. **In order to influence ASC purchasing decisions, Dr. Trattler recommends that a surgeon have:**
 - a. >25% ownership share
 - b. >10% ownership share
 - c. >5% ownership share
 - d. Ownership share does not matter

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