



Eric Donnenfeld, MD

New perspectives on cataract surgery

by Eric Donnenfeld, MD

Based on results of the 2015 ASCRS Clinical Survey, which compiled feedback from more than 2,000 unique respondents, 68% of members do not have patients who receive laser-assisted cataract surgery (LACS) (Figure 1).

The survey also revealed clinical areas where respondents think LACS may provide significant clinical benefits compared with conventional surgery: capsulorhexis, 59%; arcuate refractive incisions, 58%; and lens fragmentation, 45%.

More than half of respondents were not very confident or not at all confident that there is an adequate reimbursement solution (private pay and/or insurance) to support LACS. This seems to be a limiting step for many surgeons.

What percentage of your cataract patients receive femtosecond laser cataract surgery?

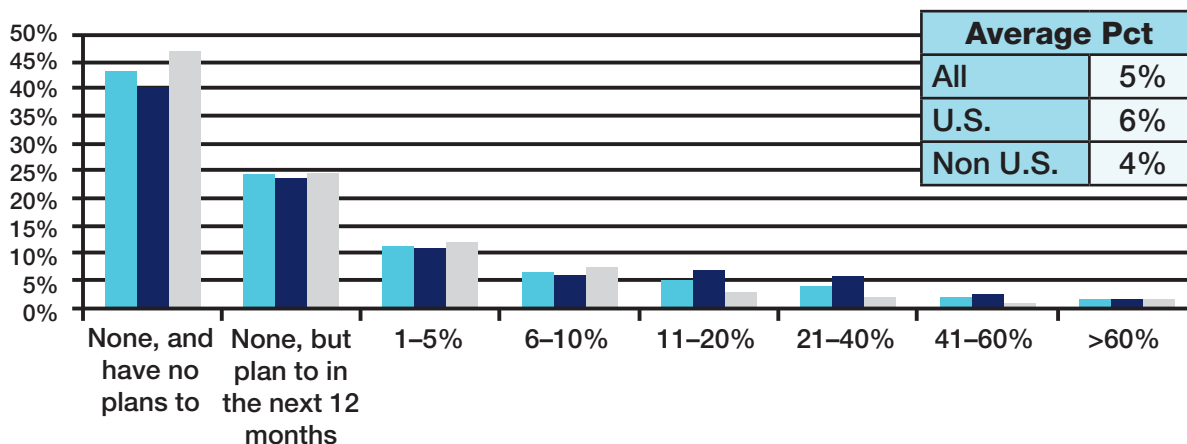


Figure 1. Sixty-eight percent of respondents currently do not have patients who receive femtosecond laser cataract surgery.

When questioned about barriers to adoption, more than 70% reported that LACS is not a viable economic model for their practices.

Our panel of experts will help surgeons dismantle the barriers that stand between them and LACS and

share recommendations for implementing LACS. They treat patients from different economic environments throughout the country and are successful with LACS. This is a once-in-a-lifetime opportunity to improve patients' quality of vision.

Dr. Donnenfeld practices with Ophthalmic Consultants of Long Island and Connecticut and is a clinical professor of ophthalmology, New York University, and trustee, Dartmouth Medical School.

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Educational Objectives

Ophthalmologists who participate in this activity will:

- Analyze the quality and quantity of the most recently available studies on LACS
- Describe accessibility pathways and reimbursement and practice flow models
- Develop a customized plan for appropriate patient education and staff support to facilitate integration into practice

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Eric Donnenfeld, MD

The future is now: a meta-analysis of LACS peer-reviewed literature

by Eric Donnenfeld, MD

Published papers on lenticular or cataract surgery applications for femtosecond lasers

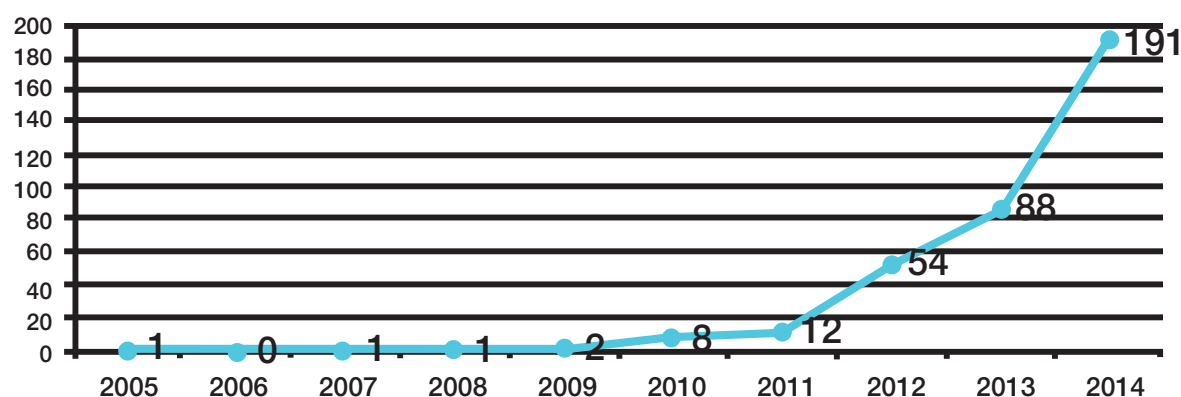


Figure 1. The peer-reviewed literature regarding LACS continues to increase.

The top goals of laser-assisted cataract surgery (LACS) are to improve the safety profile of surgery, improve refractive outcomes, and improve patient comfort and satisfaction. These are accomplished by performing more efficient lens fragmentation and removal and making more precise and accurate capsulotomies, cataract incisions, and astigmatic incisions.

LACS literature

The peer-reviewed literature pertaining to LACS is growing significantly, providing information about arcuate incisions, capsulorhexis, and reduced phacoemulsification time and energy (Figure 1). Of course, the overarching concerns are increased safety and efficacy.

As with any technology, there are potential risks and a learning curve. To reduce this learning curve, it is important to learn from surgeons who have studied this technology and spend time with experienced surgeons.

Loriaut et al. showed reduction of corneal astigmatism from 2.68 D before surgery to 0.58 D 6 months after intrastromal arcuate incisions

were performed.¹ LACS is needed to create intrastromal incisions. In the future, we will frequently use intrastromal incisions that will be selected automatically by the laser—with no breakage of the epithelium, no pain, and no need for antibiotics.

Schultz et al. reported that the femtosecond laser produces capsulotomies with a more consistent size and shape compared with manual techniques.² In addition, the capsulotomy can be centered on the pupil and therefore attain better refractive outcomes.

A paper by Mayer et al. showed that LACS significantly reduces effective phacoemulsification time.³ Less phacoemulsification time results in

clearer corneas, less endothelial cell loss, and better safety.

The safety of femtosecond laser continues to improve. It is comparable to that of conventional surgery and probably better; however, long-term studies are needed to document this.⁴

Peter Barry, MD, Dublin, Ireland, reported at the European Society of Cataract & Refractive Surgeons (ESCRS) meeting that LACS matches but does not outperform phacoemulsification.⁵

Conclusion

The peer-reviewed documentation regarding LACS is growing. LACS is a more controlled procedure, offering surgeons the ability to perform better incisions, intrastromal incisions, and self-sealing wounds, as well as precise capsulotomies for improved refractive results. It can reduce phacoemulsification time and energy. We're offering our patients an opportunity for better vision quality and safety and a procedure that can make a difference in their lives.

With all new procedures there are risks, which we must continue to assess. There is a learning curve, as we discovered with LASIK, but

manufacturers continue to advance the technology.

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“The peer-reviewed documentation regarding LACS is growing.”

—Eric Donnenfeld, MD



Robert Weinstock, MD

Femtosecond laser as a cornerstone to improving refractive outcomes

by Robert Weinstock, MD

Most innovative cataract surgeons recognize that cataract surgery has become refractive surgery, and astigmatism correction is an important part of this procedure.

Astigmatism can be corrected easily at the time of cataract surgery. However, data from the 2015 ASCRS Clinical Survey show that a good portion of cataract surgeons are not performing astigmatic corrections for low amounts of astigmatism—steps that are easy to integrate into practice, especially with the femtosecond laser.

Astigmatism correction

Toric intraocular lenses (IOLs) provide an excellent solution for patients with more than 2 or 3 D of astigmatism, but most patients have less than 1 D of astigmatism, which can be corrected with limbal relaxing incisions (LRIs). If we do not correct it, the patient will not have 20/20 vision after cataract surgery.

The 2015 ASCRS Clinical Survey revealed that 42% of respondents do not think arcuate refractive incisions created with a laser are better than conventional incisions. However, when we make arcuate incisions we

- Femtosecond laser-assisted arcuate keratotomy versus toric IOL implantation for correcting astigmatism
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Figure 1. A growing body of literature addresses femtosecond arcuate incisions. This list includes 2015 publications alone.

see how precise lasers are compared with manual methods, gaining a strong sense of confidence in correcting low amounts of astigmatism.

Weighing manual vs. laser incisions

When we create incisions with the laser, many barriers disappear. It is more accurate, incisions are reproducible, and it is precise.

An increasing body of literature shows the value of reducing astigmatism with the femtosecond laser (Figure 1). It is one of the best features of laser-assisted cataract surgery (LACS), providing patients with better uncorrected visual acuity after cataract surgery.

Femtosecond laser imaging takes multiple readings to precisely find

the anterior and posterior surface of the cornea, driving the laser treatment.

When we look at the femtosecond laser incisions under the slit lamp, it is amazing how clean and perfect they are, and they are exactly where we program the laser to place them. The arcuate incisions can be opened in the operating room or 3 weeks later at the slit lamp based on the manifest refraction. The vast majority of patients have no epithelial defects.

In contrast, when we rely on manual methods, reproducibility may be decreased, and it is more difficult to place incisions at the correct optical zone because the human hand is subject to error.

New-generation femtosecond laser systems integrate imaging and automated planning, registration to avoid errors related to cyclotorsion or head tilt, and software to drive incisions.

Conclusion

LACS provides automation, registration, and improved learning curves compared with manual methods. It can be applied to the vast majority of patients who are not candidates for toric IOLs because they have low amounts of cylinder. It is much easier and more precise than using manual LRIs.

Dr. Weinstock is in private practice, Eye Institute of West Florida, Largo.



Tal Raviv, MD

Ten femtosecond laser phaco pearls

by Tal Raviv, MD

- 1. Capsulotomy: Center the capsulotomy on the lens, not the pupil.** To improve 360-degree capsule-intraocular lens (IOL) overlap for better refractive stability, surgeons should center the capsulotomy on the crystalline lens, which is possible with optical coherence tomography imaging guidance.
- 2. Capsulotomy: Be mindful of capsulotomy edge gas bubbles.** During capsulotomy removal, surgeons should be mindful of possible micro-attachments. Separating a micro-adherent femtosecond laser-created capsulotomy is straightforward

and similar to tearing perforated paper—it doesn't require "folding over," as with a traditional capsulorhexis tear.

3. Hydrodissection: Release trapped gas.

Before, during, or after hydrodissection, the surgeon should depress the nucleus to decompress trapped gas created by the femtosecond laser during lens softening. The gas creates a pneumo-dissection, after which the lens moves readily.

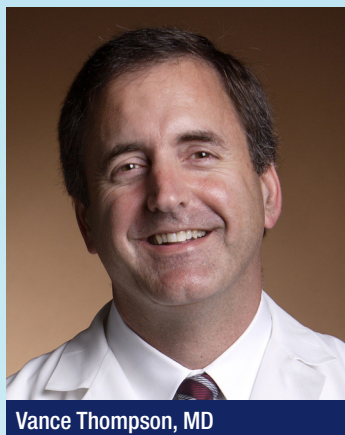
4. Hydrodissection: Tent and wiggle the cannula tip to ensure cortical cleavage.

To ensure good cortical separation, lift the capsulotomy edge and wiggle the cannula tip from side to side while injecting balanced salt solution to hydrodissect the lens between the capsule and cortex. (The pneumo-dissection typically occurs between cortex and epinucleus.)

5. Fragmentation: Customize the fragmentation pattern to the lens density.

With LACS we can customize fragmentation to different lens densities (Figure 1). To increase the softening

When adopting laser-assisted cataract surgery (LACS), the following pearls can help surgeons achieve optimum surgical outcomes.



Vance Thompson, MD

Weighing the impact of laser-assisted cataract surgery

by Vance Thompson, MD

To determine the best course of action, we consider the patient's age, symptoms, and findings from the slit lamp examination.

In addition, diagnostic advances allow us to quantify our findings. One technology I use is the HD Analyzer, which uses a double-pass method of measuring forward scatter, the same scatter the patient sees. iTrace technology also is helpful in pinpointing whether the problem is in the lens or cornea. The Pentacam allows me to quantify lens density in an early cataract situation.

Patients are learning more about advances in laser-assisted cataract surgery (LACS) and premium implants on the Internet and ask us which option is best. To help them make this decision I ask them: What vision do you want? Do you want to use glasses for most of your activities or would you prefer to go without glasses for most of your activities? These questions generate a good discussion about the vision they seek and the technology that gives me

When weighing the integration of premium technology into their practices, surgeons need to consider its impact on their practices.

Pinpointing the problem

When we discuss the aging lens with patients, I find it helpful to talk about dysfunctional lens syndrome.

The first stage is presbyopia, when the lens is still clear but has lost its flexibility, and the third is when the lens is cloudy and has lost its flexibility. However, in the second stage, when the lens is yellow and hazy, the term dysfunctional lens syndrome can be especially helpful.

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effect, decrease the grid spacing interval with increasing lens density.

6. Phaco technique: Recognize that femtosecond mini chop provides easier vertical chop.

There is no need to sculpt or groove after femto segmentation/softening. The chopper is used only to separate the pre-segmented quadrants as the phaco holds. I use this technique for 2++ NS and greater lens densities.

Aspiration-driven lens removal takes center stage in femto phaco. Nevertheless, my goal is not zero phacoemulsification; it is zero complications.

7. Phaco technique: Realize that "femto flip" is a safer and easier supracap technique.

The supracapsular phaco technique has been shown to be safe and effective, but with LACS femto flip is even safer. I use this for 2+ NS and less dense nuclei. With a 5.3-mm capsulotomy and following femto softening, this femto flip technique is typically performed with the epinucleus setting, resulting in minimal phaco energy, decreased fluid use, and increased safety.

8. Capsulotomy in small pupil: Have a small pupil strategy.

For small pupils, I encourage everyone to use phenylephrine 10% drops preoperatively, if not medically contraindicated. I advise each surgeon to have in mind a minimum acceptable capsulotomy size (i.e., >4.5 mm).

For smaller pupils, one can suppress the capsulotomy and still perform the fragmentation.

9. Fragmentation without capsulotomy: Know how to respond to small pupil, dense lens.

In cases with a small pupil and dense lens, I suppress the capsulotomy and selectively continue with femto fragmentation (off-label use). Then I perform a manual capsulorhexis after viscodissection, pupil stretch, or ring placement. In the many cases where I have performed fragmentation without capsulotomy, I have not witnessed any significantly increased intralenticular pressure.

10. I/A: Use silicone tip, single-use I/A.

A flexible, single-use silicone tip I/A is safer and easier for the stickier cortex in femto phaco. Furthermore,

Transportable access "Pay as you grow"	Fixed access "Maximizing your ROI"
<ul style="list-style-type: none"> • Transportable access on alternate weeks • Experienced laser engineer/operator • Keep pace with demands of market 	<ul style="list-style-type: none"> • Fixed laser available for all surgeries • Facility staff are laser operators • Market share growth strategy
10 to 20 cases/month	>20 cases/month

Figure 1. Weighing the benefits of fixed-access versus transportable access

the most confidence to help them achieve their goals.

Financial considerations

Surgeons who are interested in providing premium technology may be daunted by the financial aspects. Although they understand how to manage the therapeutic insurance-

based part of cataract surgery, the refractive part, which patients pay for, may be intimidating. It can be complicated because additional tests and technology are required preoperatively, intraoperatively, and postoperatively.

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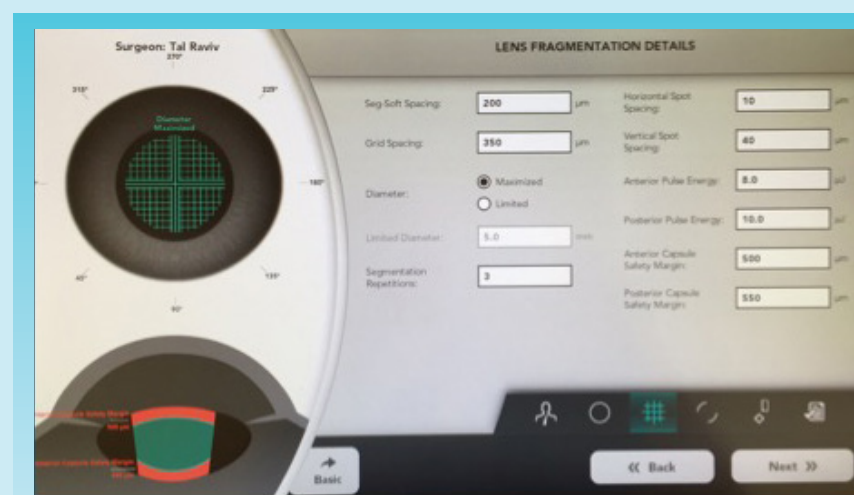


Figure 1. Using LACS, surgeons can customize the fragmentation pattern to the lens density.

a soft silicone port allows worry-free polishing of the subincisional space, posterior capsule, and anterior capsular rim. Although it costs more, this is a premium procedure requiring premium technology.

Dr. Raviv is clinical associate professor of ophthalmology, Icahn School of Medicine, Mount Sinai, and founder and medical director, Eye Center of New York.

Conclusion

When using LACS, we need to know how to make the most of femtosecond laser technology to achieve the best surgical outcomes.



Gary Foster, MD

When choosing to implement laser-assisted cataract surgery (LACS) in an ophthalmology practice, surgeons need to be sure they are ready to make the full commitment.

Gathering the team

To implement LACS successfully, surgeons need to be sure all team members are on the same page. If the surgeon and staff give different signals, patients will be confused.

In my practice, we sat down with everyone on our team and reviewed findings of each of the scientific studies, which showed less tilt, less coma, better centration, better corrected distance vision, less corneal edema, and less macular edema. Our staff were impressed with these data and were all behind the technology. I did not need to drive the effort, and we were all on the same page.

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It is important to have a financial informed consent to help patients make this decision.

In weighing whether to adopt LACS, surgeons also need to consider the economics of not offering it to their patients. There are ongoing pressures to improve financial performance in medical practices. In addition, the marketing transformation, which touts bladeless surgery and other advances, is underway.

If surgeons are not yet sold on the advantages of femtosecond laser technology and desire to answer the question themselves, they may opt for a transportable laser (Figure 1). With mobile lasers, there is no guaranteed financial commitment. They do not have to train an operator or have a laser engineer because they

Committing to laser-assisted cataract surgery

by Gary Foster, MD

Establishing pricing

In addition, clinicians need to establish a price that makes sense to them, their staff, and patients.

There are two basic strategies. With a one-price bundling approach, everyone who receives a toric lens or presbyopia-correcting lens also receives LACS. In this situation, we don't need to discuss the laser. The other is an a la carte approach, where patients can pay a higher price for laser and toric or they can pay a lesser price for the toric and manual surgery.

The advantage of the bundling approach is that it is simple and makes it easier to speak with the patient. The benefit of the a la carte option is that it allows patients to price discriminate if they cannot afford the bundle price.

Educating patients

In implementing this technology, surgeons also need to develop an effective education plan, determining in advance who will educate patients about their options, recommend what is best for their eyes, and discuss financial aspects of the procedure (Figure 1).

In our practice, we email patients a video link before their appointments. When they arrive for their visit, patients watch additional educational videos.

come with the laser. In addition, they do not have to pay expensive maintenance costs.

After performing approximately 20 cases per month, however, it begins to make sense for surgeons to consider investing in their own laser.

Conclusion

The bottom line is that surgeons need to assess the economic impact if they decide against LACS. It is becoming increasingly challenging to operate a financially healthy medical practice, and advanced technologies that bring patient benefit can significantly improve both the bottom line and the joy of practicing medicine.

LACS is affordable and the benefits and risks can be calculated. We need to make the best decisions

Effective education plan

Options:	Before arrival: Email video link During dilation: Video
Recommendation:	Administer questionnaire Use: "I recommend" • Presbyopic IOL • Toric IOL • Single-vision IOL
Financial options:	Counselor

Figure 1. Patient education plan

We also ask them to complete a questionnaire outlining their lifestyle desires and visual needs.

It is important to recommend what we believe is the best option for them. I explain, "Based on what you have told me about what you want, I would recommend the following lens." I'm very specific about the lens, and I'm very clear about why I recommend it, what I dislike, and what it will not do for them. The patient then moves on to the scheduler, who discusses insurance and financial factors.

Planning flow

The practice also needs to plan efficient flow. If the surgeon operates in one room and the laser is outside

that room, it does not affect surgeon flow. The surgeon can perform the case and leave the room to perform a laser procedure while staff is turning over the room.

Conclusion

Surgeons who choose LACS should make a definitive decision and move forward without vacillating, for the benefit of both patients and staff. Everyone on the team should be on the same page. Surgeons also should establish a price that makes sense, an effective education plan, and an efficient flow.

Dr. Foster is a cataract and laser eye surgeon in Fort Collins, Colo.

“If surgeons are not yet sold on the advantages of femtosecond laser technology and desire to answer the question themselves, they may opt for a transportable laser.”

—Vance Thompson, MD

for our patients, but it is a nice side benefit when it makes our practices healthier.

Dr. Thompson is director of refractive surgery, Vance Thompson Vision, Sioux Falls, S.D.

Dismantling barriers: Clinical pearls and practical guidance to implement laser-assisted cataract surgery

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CME questions (circle the correct answer)

1. **According to Dr. Donnenfeld, to reduce the learning curve associated with laser-assisted cataract surgery, surgeons should:**
 - a. Hire additional professional staff
 - b. Research which patients are the best candidates for the procedure
 - c. Learn from surgeons who have studied the technology
 - d. Hold informational training sessions for staff

2. **According to Dr. Weinstock, when weighing the differences between manual and femtosecond laser as used to correct astigmatism, the femtosecond laser:**
 - a. Is more accurate
 - b. Creates reproducible incisions
 - c. Is precise
 - d. All of the above

3. **Dr. Thompson explained that surgeons who are intimidated by the financial commitment of laser-assisted cataract surgery may benefit from:**
 - a. Using a mobile laser
 - b. Postponing implementation of laser-assisted cataract surgery
 - c. Developing a financial informed consent to help patients make decisions
 - d. Exploring other technologies

4. **According to Dr. Raviv, when customizing the fragmentation pattern to the lens density, to increase the softening effect surgeons should:**
 - a. Decrease the grid spacing interval with decreasing lens density
 - b. Decrease the grid spacing interval with increasing lens density
 - c. Use a grid spacing interval of 600 μm
 - d. Increase the grid spacing interval with increasing lens density

5. **According to Dr. Foster, which of the following is NOT useful when implementing laser-assisted cataract surgery in an ophthalmology practice:**
 - a. Developing efficient flow
 - b. Establishing pricing
 - c. Encouraging patients to choose their own options based on patient education, without specific recommendations
 - d. Educating staff about laser-assisted cataract surgery research

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