

Advanced Technologies Contribute to Premium Surgical Outcomes



How technologies by Lumibird Medical are supporting our new refractive surgery center.

By Brett Mueller II, DO, PhD, PCEO, and Taj Nasser, MD

Brett Mueller II, DO, PhD, PCEO: Given the demands of the aging population in the United States, with projections of cataract surgical volume reaching 8 million per year within the next 15 to 20 years,¹ we need surgery supercenters that can operate at a very high capacity and still offer the highest quality of service for patients. Thus, I founded a new refractive and cataract surgery center, Mueller Vision LASIK & Cataract Eye Surgery, in Fort Worth, TX, this year. Dr. Nasser is joining my practice because he shares my vision of building a

premium refractive and cataract surgical practice that's at the forefront of both clinical technology and business strategy.

Taj Nasser, MD: There are currently three of us—two surgeons and an optometrist—launching this refractive surgery center very early in our careers (Figure 1). Our goal is to create a synergistic relationship between the two specialties. In this ever-changing landscape, where technology and medical practices evolve rapidly, our center will stand as a beacon of innovation and hope. By pooling our diverse expertise, we are positioned to offer superior patient care and pioneering treatments for the Dallas-Fort Worth community and beyond.

Dr. Mueller: Patients benefit most when both their primary eye care doctor and their surgeon are involved in their surgical care. We think this collaborative care model best achieves that goal, with optometrists providing the primary eye care and surgeons performing the surgeries.

Dr. Nasser: Another way in which we intend to differentiate our practice is by always using cutting-edge surgical and practice-management technologies, regardless of how early our adoption is. For example, ours is one of the first practices in the area to offer the Light Adjustable Lens (LAL; RxSight), and we routinely use the ICL (STAAR Surgical Company).

To achieve the best outcomes with these refractive lens technologies, we've chosen equipment from Lumibird Medical—namely, the ABSolu A/B/S/UBM Ultrasound Platform with sulcus-to-sulcus (STS)

module for ICL measurements, and the Tango Reflex™ Neo Nd:YAG laser with the Premium Refractive Outcome Capsulotomy (PROcap) technique. We like partnering with Lumibird because it is a great company that is constantly innovating—an ethos we share.

THE ABSOLU A/B/S/UBM ULTRASOUND PLATFORM

Dr. Nasser: Dr. Mueller and I are focused on how we can improve our outcomes and the patient experience for ICL surgery. When implanting an ICL, choosing the correct size is a crucial safety parameter. The ABSolu Ultrasound Platform has the superior imaging capabilities we need to obtain the most accurate measurements for ICL implantation. First, its depth of field allows us to see the entire eye in incredible detail. It uses an innovative technology, a 50-MHz probe that uses an STS module that allows an automatic measurement of the STS length, lens curvature, and anterior chamber depth (see the sidebar, *The STS Module on the ABSolu*). We can see everything from the anterior part of the vitreous to the wall in a single scan. It scans the eye linearly, which allows for a faster scan rate and higher resolution. Obviously, the higher the resolution, the better the quality of the image, and the more accurately I can size an ICL for a safer and better visual outcome. Also, the resolution of the ABSolu's images is high enough that we can use artificial intelligence (AI) applications to assess their data. We are beginning to use AI in a lot of our diagnostics, and Lumibird's platforms support this effort.



Figure 1. The team at Mueller Vision LASIK & Cataract Eye Surgery (left to right): Taj Nasser, MD; Brett Mueller II, DO, PhD, PCEO; and Rebecca Miller, OD.

Sponsored by Lumibird Medical

THE STS MODULE ON THE ABSOLU

For implanting anterior-chamber IOLs, the STS module with the 50-MHz probe enables surgeons to view the entire anterior chamber in one single scan. Surgeons may efficiently check the anterior chamber and perform angle-to-angle measurements easily (Figure 2).

This option is being considered on ABSolu® for STS measurements prior to Implantable Collamer Lens (ICL) surgery. The optional STS module allows an automatic measurement of the STS length, lens curvature, and anterior chamber depth.

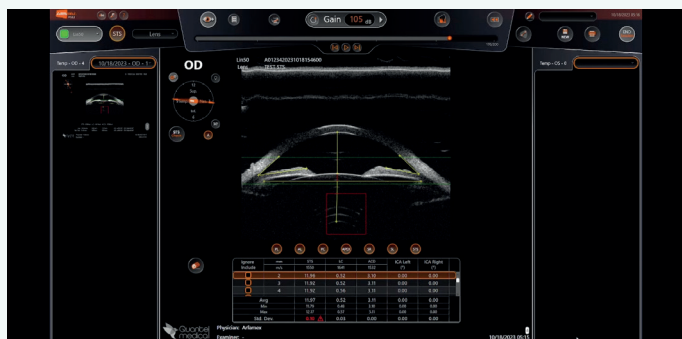


Figure 2. The ABSolu's STS software that connects with the UBM probe.

THE VAULT ALGORITHM FOR ICL SIZING

Dr. Nasser: Because of my interest in AI and its potential applications in ophthalmic surgery, about a year ago, I collaborated with a team of colleagues to develop a deep-learning model to accurately predict the postoperative vault of ICLs. Although many patients do well with current nomograms, we'd like to address the ICL outliers who receive suboptimal outcomes.

We trained a neural network to examine every pixel of UBM images. In a pilot study we conducted, we found much better predictability using AI than with traditional nomograms. The mean absolute errors with the AI-powered predictive model for the 12.1-mm, 12.6-mm, and 13.2-mm sizes of the ICL were 66.3 μ m, 103 μ m, and 91.8 μ m with 100%, 99.0%, and 96.6% of predictions within 500 μ m, respectively.² We want to continue collaborating with Lumibird on how to best extract data and use it in innovative ways to size ICLs so that, long-term, we can improve the status quo.

TANGO REFLEX™ NEO ND:YAG LASER WITH PROCAP

Dr. Mueller: The refractive surgery mindset is to pursue a margin of error of zero. Having to do an Nd:YAG capsulotomy that leaves an iatrogenic floater can ruin an otherwise successful premium cataract surgery. The PROCAP technique on the Tango Reflex Neo laser clears

out the posterior capsule with greater precision and repeatability than a traditional capsulotomy. It delivers a short, low-energy laser pulse behind the posterior capsule to create an opening in the shape of a polygon. Then, it extends the capsulotomy by adding pulses beneath each angle under tension. Next, the laser pulse ionizes intraocular matter via the shockwave of a cavitation bubble forming and collapsing as it moves toward the posterior capsule. The Tango Reflex Neo's 2-mm (2,000 μ m) offset produces a powerful jet effect from the collapsing cavitation bubble to cleanly dissect tissue. Because the distance is 4x greater from the lens (a traditional capsulotomy is 300-500 μ m), and because the PROCAP technique has a unique mechanism of action, there's very little debris left by the cavitation bubble, and it nearly eliminates any risk of pitting the lens. Premium-outcome capsulotomies are incredibly important now, with the advent of lenses made of silicone, such as the LAL, which are more susceptible to pitting.

Dr. Nasser: The PROCAP technique is also important for implanting the LAL; clearing the posterior capsule for the LAL will improve the accuracy of outcomes for certain patients. What really distinguishes the PROCAP from other Nd:YAG laser techniques, however, is its 2-mm posterior offset and its photodisruption approach of clearing the capsule. With PROCAP, the shockwave from the cavitation bubble passes more anteriorly than the traditional approach and therefore is safer for the IOL. Patients are more satisfied when they have fewer floaters, and using higher energy delivery with more posterior offset is more efficient. The PROCAP technique has truly re-standardized the way capsulotomies should be done, and it could not have come at a better time, with the rapidly changing landscape in premium IOL surgery. ■

1. Lindstrom RL. Future of cataract surgery seems promising. *Ocular Surgery News*. February 1, 2021. <https://www.healio.com/news/ophthalmology/20210126/future-of-cataract-surgery-seems-promising#:~:text=The%20mean%20age%20of%20the,making%20surgery%20safer%20and%20faster>. Accessed July 11, 2024.

2. Nasser T, Hirabayashi M, Viridi G, Abramson A, Parkhurst G. VAULT: vault accuracy using deep learning technology: new image-based artificial intelligence model for predicting implantable collamer lens postoperative vault. *J Cataract Refract Surg*. 2024;50(5):448-452.

BRETT MUELLER II, DO, PHD, PCEO

- Founder and physician/CEO at Mueller Vision LASIK & Cataract Eye Surgery, Fort Worth, TX
- brett.mueller@muellervision.com
- www.fortworth-lasik.com
- Financial disclosure: Consultant (Alcon, Glaukos, Johnson & Johnson Vision, Lumibird Medical, RxSight, STAAR Surgical Company, Tarsus, Zeiss)

TAJ NASSER, MD

- Refractive surgeon, Mueller Vision LASIK & Cataract Eye Surgery, Fort Worth, TX
- Medical Director, Tylock George Eye Care and Laser, Dallas, TX
- tajnassermd@gmail.com
- Financial disclosure: Consultant (Alcon, Lumibird Medical, STAAR Surgical Company, Tarsus)