

Predictions for Retinal Surgery

Evolution and revolution will continue in 2015 and beyond.

BY SZILÁRD KISS, MD

It is difficult to make accurate predictions of the future; it is, nonetheless, interesting to speculate where we will be a year from now in vitreoretinal surgery. I believe that four distinct areas show special promise for 2015.

DECREASING RELIANCE ON BUCKLING

An important technique in retinal detachment repair in the past, scleral buckling (SB) will continue to be replaced by the more modern, and some would argue more elegant, techniques of pneumatic retinopexy (PR) and pars plana vitrectomy (PPV). The preferences and trends (PAT) survey by the American Society of Retina Specialists (ASRS)¹ and US Medicare payment data both show a declining trend in the use of SB (Figure 1).² In 2015, that trend will undoubtedly continue.

While there may always be a limited number of patients who can benefit from SB, that number will continue to diminish. More notably, recently trained vitreoretinal fellows who are now tasked with real-world retina surgery procedures are more likely to use PPV and PR—techniques they are much more familiar with—further contributing to the slow demise of SB.

ADVANCES IN INSTRUMENTATION FOR PPV

A revolution has taken place in both the size and speed of vitreous cutters.

Size. The PAT survey¹ highlights the move away from traditional 20-gauge (g) vitrectomy techniques toward minimally invasive vitreous surgery (MIVS). I have not performed 20-g vitrectomy in more than 7 years. Just this year, our hospital stopped stocking 20-g vitrectomy instruments, a trend that will continue as more centers phase out 20-g vitrectomy in 2015. In 2012 and 2013, MIVS meant either 23- or 25-g instrumentation. In 2014 and 2015, however, it includes 27-g (Figure 2).*

Speed. Several manufacturers have released 27-g instrumentation that is not only small but that also allows high-flow, fast-cutting surgery. The probes of these 27-g instruments are stiff enough to use in complex surgeries

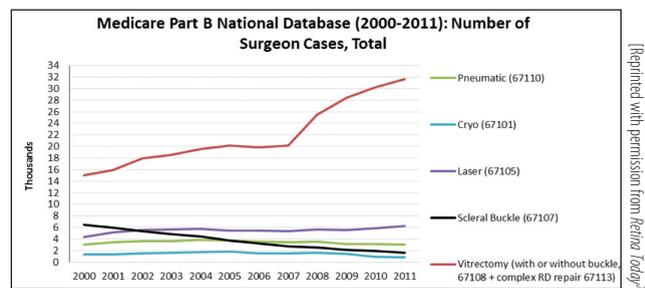


Figure 1. Medicare claims data show the increase in use of the PPV code and the decline of scleral buckling.

but equally useful in more straightforward macular puckers and retinal detachments. Cutter geometry and speed and vitreous cutter duty cycle will continue to evolve in 2015 as MIVS overtakes 20-g vitrectomy. To put this in perspective, typical cutter speeds of 20-g probes were around 750 to 1,000 cuts per minute (cpm). In the era of MIVS, cutter speeds are routinely above 5,000 cpm. When combined with optimal cutter geometry and duty cycle control, routine use of 7,500 to 8,000 cpm will dominate MIVS in 2015.

Some early adopters of MIVS with 27-g instrumentation already use the technique for nearly all cases, independent of indication. Experience with 27-g vitrectomy was limited to a few centers in 2014; however, 2015 will mark more widespread use for far more indications (eyetube.net/?v=uguse).*



BEYOND TRADITIONAL INDICATIONS

In 2015, nontraditional indications for vitreous surgery will begin to emerge, and, perhaps in 10 years, some of these may even overtake traditional indications such as retinal detachment, macular hole, and macular pucker. The nontraditional indications that have begun to appear fall into two broad categories: implantation of devices and delivery of biologic material such as gene therapy and stem cells.

Implantation of devices. What jumpstarted this trend

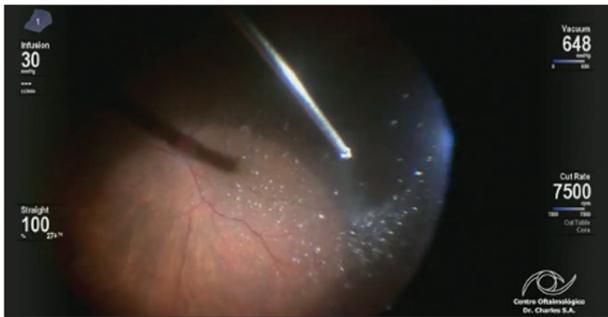


Figure 2. A 27-g PPV procedure in a patient with an epiretinal membrane, a decrease in visual acuity, and metamorphopsia.*

was the FDA approval of the Argus II Retinal Prosthesis (Second Sight). Many patients worldwide with vision loss for which there was no treatment can now have the Argus II device implanted in their eyes—a vitreoretinal procedure that may take 4 to 5 hours of surgery. Other implantable artificial retina devices are on the way and may appear on the market in 2015 or soon thereafter.

Several devices that treat medical retina disorders such as age-related macular degeneration (AMD) also require surgical implantation. Two devices in late-stage clinical development are the ranibizumab port delivery system (PDS; ForSight Vision4 and Genentech/Roche) and Encapsulated Cell Technology (ECT; Neurotech). Both technologies aim to lessen the burden of repeated intravitreal injections and will require surgical implantation by a vitreoretinal surgeon.

Gene therapy and stem cells. Long-term treatment of AMD with gene therapy and stem cells has received a lot of attention in 2014. These treatments may change the surgical landscape in 2015 and beyond. Delivery often requires a sub-retinal or suprachoroidal injection done in an operating suite.

ADVANCES IN RETINAL IMAGING

High-resolution optical coherence tomography (OCT) has revolutionized the diagnosis and follow-up of medical retina patients, but the technology is just beginning to make inroads for our surgical retina patients. In 2015, OCT will play an ever-increasing role in the pre-, intra-, and postoperative care of our surgical retina patients.

Pre- and postoperative retinal imaging. Vitreoretinal surgeons have begun to realize the importance of retinal structures visualized on OCT in the preoperative planning in a variety of retinal pathologies, including macular pucker surgery and retinal detachment repair. In macular pucker, for example, the integrity of the outer retinal structures may help predict postoperative visual recovery.³ Moreover, high-resolution OCT images following surgical maneuvers, such as internal limiting membrane peeling, show inner retinal changes that we are only beginning to understand. Similarly, in patients with nontraumatic rhegmatogenous

TAKE-HOME MESSAGE

- SB will continue to be replaced by the more modern techniques of PR and PPV.
- Next year may mark the time in which microscope-integrated intraoperative OCT emerges from the research arena into clinical practice.

retinal detachments, outer retinal changes on pre- and post-repair OCTs and ultra-widefield autofluorescence abnormalities may help explain the course of visual recovery and the ultimate visual acuity in many patients.^{5,6}

Intraoperative imaging. The year 2015 may mark the time in which microscope-integrated, intraoperative OCT emerges from the research arena into a commercially viable tool.⁶ Haag-Streit, Carl Zeiss Meditec, and Bioptegen are three companies with promising technologies that have proven to be tremendously useful in the operative setting, especially in macular surgery cases. These systems allow real-time viewing of OCT images without the need to pause surgery. OCT in this setting has the potential to transform our approach to retina surgery in the same way it has changed our understanding of medical retina conditions.

CONCLUSION

Although the vitreoretinal fellows of today are not learning subtle SB techniques, they are being exposed to what may be the future of retina surgery as all of these nontraditional indications emerge into routine practice.

To quote Winston Churchill, “The future is unknowable, but the past should give us hope.” Today we can say that the future of retina surgery is bright, and evolution and revolution will continue in 2015 and beyond. ■

*Video and Figure 2 courtesy of Martin Charles, MD; Dina J. Abulon, MS; Daniel E. Charles, MD; and Norberti Cabrera, MD

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