

# BEST PRACTICES FOR MIVS

With the trend toward smaller-gauge surgical platforms, a solid understanding of the options is necessary for success.

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Microincision vitrectomy surgery (MIVS) systems have evolved significantly in the past decade, leading to the creation of 23- and 25-gauge platforms, which in large part have replaced traditional 20-gauge pars plana vitrectomy (PPV).

According to the 2013 American Society of Retina Specialists (ASRS) Preferences and Trends Survey, 96.3% of US retina surgeons and 92.8% of international retina surgeons use MIVS systems.<sup>1</sup> Initially described by Fujii and colleagues,<sup>2</sup> and subsequently supported by Lakhanpal et al<sup>3</sup> and others, the use of smaller-diameter instrumentation with self-sealing, transconjunctival scleral wounds offers several advantages, including decreased postoperative pain and inflammation, decreased postoperative induced astigmatism, and faster visual recovery.<sup>4,5</sup> This article takes a look at considerations involved in adopting MIVS instrumentation and moving toward the smaller gauges now available.

## FAVORABLE REPORTS FOR SMALLER GAUGES

In a 2010 report by the American Academy of Ophthalmology, visual outcomes and complication rates of MIVS were found to be commensurate with those of 20-gauge vitrectomy benchmarks.<sup>6</sup> The smallest MIVS instrumentation included in that report was 25-gauge.



## AT A GLANCE

- MIVS is now the standard for PPV, but questions remain about which gauges are best for which indications.
- Smaller incision size and simpler, neater wound architecture give 27-gauge surgery an advantage over 23- and 25-gauge surgery, reducing the risk of vitreous prolapse and allowing faster wound healing.
- Although 27-gauge surgical instrumentation is designed to deal with all vitreoretinal pathology, surgeons should be selective with their first cases and approach this smallest of gauges in a stepwise fashion.

Since then, 27-gauge instruments have become available.

In 2010, Oshima and colleagues described the initial feasibility and safety of a novel 27-gauge MIVS system, reporting excellent visual and anatomic outcomes in a series of 31 patients.<sup>7</sup> As with reports describing the initial experiences with 23- and 25-gauge MIVS systems, this series focused primarily on macular cases of relatively low complexity. With the use of one-stage, straight incisions, no postoperative wound-related complications were encountered. The authors suggested that smaller 27-gauge instrumentation may reduce wound integrity concerns encountered with 23- and 25-gauge systems.<sup>7</sup>

Recently, Khan et al reviewed 95 patient cases using transconjunctival 27-gauge PPV using the Constellation Vision System (Alcon) from May 2014 to January 2015.<sup>8</sup> This multicenter, retrospective, interventional case series demonstrated that 27-gauge technology was safe and effective in posterior segment disease for multiple indications. I was fortunate enough to participate in this study and be a coauthor of the article.

## SURGICAL INDICATIONS FOR MIVS

Based on these and other reports, MIVS technology is now the standard for PPV surgery. But questions remain. Are certain surgical indications *optimal* for certain gauges? Are certain indications *suboptimal* for certain gauges?

The underlying rationale for performing 27-gauge vitrectomy is that smaller is better. Scleral incision sizes for 20-, 23-, 25-, and 27-gauge vitrectomy systems are 0.9 mm, 0.6 mm, 0.5 mm, and 0.4 mm, respectively. Thus, 27-gauge incisions are 20% smaller than 25-gauge incisions. Furthermore, wound construction is simplified with the one-step incision of 27-gauge systems versus the angled-incision technique or two-step entry method commonly used with 23- and 25-gauge instrumentation. The smaller wound diameter and simpler, neater wound architecture give 27-gauge surgery an advantage over 23- and 25-gauge surgery, reducing the risk of vitreous prolapse and permitting faster wound healing.

Compared with the Constellation's 25-gauge vitrectomy port, the 27-gauge vitrectomy port is larger (0.079 mm<sup>2</sup> vs. 0.066 mm<sup>2</sup>) and closer to the cutter tip (0.211 mm vs. 0.330 mm). These features aid the surgeon in performing complex maneuvers such as vitrectomy-assisted membrane

segmentation and delamination. For these reasons, the 27-gauge system has distinct advantages over the larger gauges for membrane peeling and delamination in tractional detachments.

To address the concern of increased flexibility with 27-gauge instrumentation, Oshima et al shortened the shaft length of a 27-gauge vitreous cutter from 32 mm to 25 mm, resulting in stiffness comparable to that of 25-gauge vitrectomy systems.<sup>7</sup> Improvements in stiffness and fluidics have been particularly important for peripheral vitreous shaving and comparable maneuvers in complicated rhegmatogenous retinal detachment (RRD) with proliferative vitreoretinopathy (PVR).

### BE OPTIMISTIC, BUT PROCEED SENSIBLY

Although 27-gauge surgical instrumentation is built to adequately deal with all vitreoretinal pathology, vitreoretinal surgeons should be mindful of a potential learning curve and be selective in choosing their first cases. One should not jump directly from 20-gauge surgery to 27-gauge surgery, but instead progress in a stepwise fashion from 20 gauge to 23 gauge to 25 gauge to 27 gauge. Even surgeons accustomed to using 27-gauge systems tend to primarily perform macular cases before moving on to more challenging peripheral complex cases such as RRD

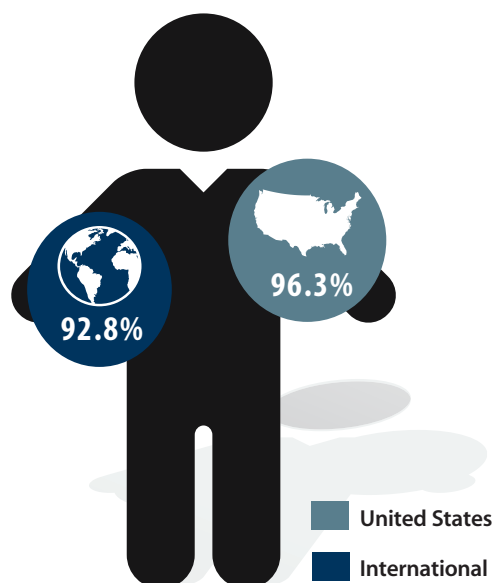
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with PVR. Our group recently reported results in 95 cases, of which only seven (7.4%) were RRDs associated with PVR.<sup>8</sup> By contrast, this report included 26 (27.4%) epiretinal membrane peels, 11 (11.6%) macular hole repairs, and 10 (10.5%) nonclearing vitreous hemorrhages.<sup>8</sup>

An exception to the macula-cases-only rule is peeling and delamination of primarily posterior pathology in tractional retinal detachments (TRD). Due to the higher cut rates, improved fluidics, and relatively smaller, thinner lumen sizes of 27-gauge instruments, TRDs are ideal candidates. The above-mentioned report included 14 TRD cases (14.7%).<sup>8</sup>

Any vitreoretinal surgeon interested in MIVS should be comfortable with his or her current gauge instrumentation before moving to a smaller gauge. The learning curve can be steep and unforgiving. That said, each gauge has advantages over the next larger gauge due to the previously stated advantages, including decreased postoperative pain and inflammation, decreased induction of astigmatism, and faster visual recovery. With each gauge, the surgeon should begin with less complex, posterior pathology and then move to more complex cases. The exception is TRDs, as the 27-gauge instrumentation is amenable to this pathology with its ability to get into small spaces for delamination and segmentation. ■

## PERCENTAGE OF RETINA SURGEONS WHO USE MIVS SYSTEMS<sup>1</sup>



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