

# Biplanar 5°/30° Insertion Technique

The one-step technique, carefully executed, ensures watertight 23-gauge wound closure.

BY JOHN S. POLLACK, MD

**T**he capability to perform sutureless surgery has become available to retinal surgeons relatively recently with the introduction of 25- and 23-gauge instrumentation. Retina surgeons have rapidly become accustomed to the advantages of sutureless wound construction, which have been enjoyed by our cataract-surgeon colleagues since the 1990s. A recent survey of preferences and trends among members of the American Society of Retina Specialists found that only 20% of those surveyed intend to use 20-gauge instrumentation as their primary mode for vitrectomy surgery in the next 5 years due to their intention to adopt 23- and 25-gauge surgery.<sup>1</sup>

Why this move from traditional 20-gauge instrumentation to the newer, smaller-gauge systems? For me, the advantages of sutureless surgery, both for the surgeon and for the patient, were apparent fairly quickly. I was an early adopter of 25-gauge instrumentation because it offered the possibility of less traumatic surgery with the potential for more rapid visual rehabilitation. However, I became dissatisfied because of the lack of stiffness of early 25-gauge instruments, and about 1 year ago I switched to using 23-gauge systems for almost all of my surgeries.

I find that 23-gauge instrumentation delivers almost the same degree of stiffness that I enjoy with 20-gauge instruments, while also offering the benefits of sutureless surgery. Another nice attribute of 23-gauge vitrectomy over 25-gauge is the availability of a 23-gauge

cutting port (Accurus Surgical System; Alcon, Fort Worth, TX) that is 30% closer to the tip (0.009 mm from the tip) than on 25-gauge vitrectomy probes (0.013–0.014 mm from the tip: Accurus [Alcon]; Millennium TSV25 [Bausch & Lomb, Rochester, NY]; 25-gauge Vitrector [MID Labs, San Leandro, CA]). This allows better access for cutting and removing preretinal tissue with or without a second instrument. Furthermore, flow characteristics and cutting speed with the 23-gauge systems now approach or equal those of 20-gauge systems.

## 5°/30° INSERTION TECHNIQUE

To minimize the risk for postoperative hypotony and endophthalmitis, a reliably watertight seal is vital in sutureless vitrectomy procedures. A meticulous cannula insertion technique is important to prevent sclerotomy leaks. After experimenting with several cannula insertion techniques with the 23-gauge instrumentation for the Accurus, I developed the biplanar 5°/30° insertion technique for one-step entry, which I have found to be an easy, reliable,



Figure 1. The trocar-cannula assembly is initially inserted at a 5° angle, almost flat or tangential to the surface of the globe, until the bevel is two-thirds into the scleral tunnel.

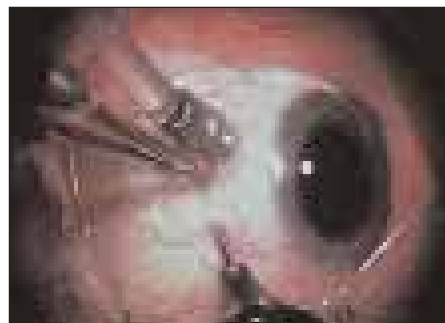


Figure 2. The trocar-cannula assembly is elevated to a 30° angle and inserted into the vitreous cavity.

and reproducible technique for creating leak-free wounds.

The technique begins with fixation of the globe by grasping the sclera through the conjunctiva with 0.12-mm forceps at exactly the position desired for internal entry of the trocar into the vitreous cavity. To effectively "grab" the sclera, it is important to approach the sclera with the tips of the forceps fairly far apart at a true 90° angle to the sclera. There are only three teeth on the forceps, so the surgeon must make sure not to miss any.

The eye is then rotated into a position to allow entry of the trocar at a tangential angle at the desired insertion site. The tip of the trocar is used to displace the conjunctiva toward the limbus. I believe that this displacement of the conjunctiva prior to cannula insertion reduces the risk of endophthalmitis.

The insertion of the trocar begins superior to the forceps, with the instrument aimed toward the tip of the forceps, parallel to the limbus. The trocar is held bevel-up, with the tip at approximately a 5° angle to the sclera—almost flat on the sclera (Figure 1). The trocar is inserted until almost three-quarters of the bevel has disappeared into the scleral tunnel. At this point, the handle of the trocar is raised until the instrument is at a 30° angle to the sclera (Figure 2), and insertion is completed.

The same principles that apply in sutureless incision design for cataract surgery apply here. The intraocular pressure (IOP) helps to seal the scleral tunnel after removal of the cannula. The cannula is removed at the same 5° angle at which it entered. I usually operate using an infusion pressure of 30 mm Hg, and I maintain this pressure during cannula removal because I believe that this level of IOP helps to collapse the internal aspect of the tunnel. To collapse the roof of the scleral tunnel during cannula removal, I press on the roof of the tunnel with a cotton swab, further ensuring watertight wound closure.

## TWO TECHNIQUES ASSESSED

The safety and efficacy of the 5°/30° one-step insertion technique was assessed in a series of 50 eyes (48 patients) that underwent 23-gauge vitrectomy.<sup>2</sup> This retrospective, single-surgeon consecutive case series included 11 eyes in which another insertion technique called the 5°/90° technique was initially used, followed by 39 eyes in which the 5°/30° technique was used. The 5°/90° technique was abandoned after the initial 11 cases, due to a higher rate of sclerotomy wound leak.

The conjunctiva was displaced prior to cannula insertion in all cases. Transconjunctival sclerotomy leaks and extensive bleb formation were absolute indications for suturing sclerotomies. The main outcome measures were the number of sutured sclerotomies, postoperative IOP, intraoperative complications, and postoperative complications.

The series included a variety of indications for vitrectomy, including 20 eyes with epiretinal membranes; 13 eyes with proliferative diabetic retinopathy, with vitreous hemorrhage and/or tractional retinal detachment; nine eyes with macular hole or inner lamellar hole; five eyes with retinal detachment; two eyes with vitreous hemorrhage (one angioma and one retinal tear); and one eye with retained lens fragments.

## RESULTS

Median preoperative visual acuity was 20/100 (range, 20/40–hand motions) and median postoperative visual acuity was 20/70 (range, 20/25–hand motions), with a mean follow-up of 12 weeks. Median IOP was 15 mm Hg preoperatively (range, 5–28 mm Hg), 14 mm Hg on postoperative day 1 (range, 5–31 mm Hg), and 14 mm Hg at 1 week postoperative (range, 5–23 mm Hg).

There were no intraoperative complications. No endophthalmitis or hypotony-related complications occurred postoperatively. Postoperative complications included retinal detachment not related to the sclerotomy site in one eye (2%), hyphema in one eye (2%), vitreous hemorrhage in four eyes (8%), and cataract progression in 20 eyes (40%).

In the first 11 cases, a 5°/90° insertion technique was used. This technique was similar to the 5°/30° technique, except that the trocar was elevated to 90° for vitreous entry instead of 30°. In these 11 cases, there were two instances of sclerotomy suturing (18%), compared with no instances in the other 39 eyes (0%) in which the 5°/30° technique was used.

## CONCLUSION

As is the case with cataract surgery, the ability to create reliably leak-free wounds is believed to be one of the most important factors affecting the risk of postoperative endophthalmitis. The biplanar 5°/30° insertion technique appears to be a safe and effective method for creating reliably watertight suture-less wounds during 23-gauge vitrectomy surgery for a variety of indications. ■

1. Mittra RA, Pollack JS. 2007 American Society of Retina Specialists Patterns and Trends Survey. Poster presented at the Annual Meeting of the American Society of Retina Specialists; December 1-5, 2007; Palm Springs, CA.

2. Pollack JS. "Biplanar 5/30 insertion technique" produces improved wound construction for 23-gauge one-step entry vitrectomy system. Paper presented at the Annual Meeting of the American Society of Retina Specialists; December 1-5, 2007; Palm Springs, CA.

*John Pollack, MD, is an Assistant Professor of Ophthalmology at Rush University Medical Center in Chicago, and practices at Illinois Retina Associates in Joliet, IL. Dr. Pollack reports that he is on the Retinal Advisory Council for Alcon Laboratories. He may be reached at +1 815 744 7515; e-mail: pollackjs@aol.com.*

