23-gauge Vitrectomy for Sutureless Vitreous Surgery

The instrumentation facilitated successful completion of surgery for a wide range of pathologies.

BY KEITH WARREN, MD

Sutureless surgery is a relatively new modality for vitreoretinal surgeons. Wounds that accommodated traditional 20-gauge vitrectomy instrumentation required suture closure. With the introduction of 25-gauge instrumentation, vitreoretinal surgeons gained the ability to leave the smaller incisions unsutured after vitrectomy, reducing intraoperative trauma and potentially speeding postoperative visual recovery. However, many also found that at least the first generation of 25-gauge instrumentation was too flexible to allow some maneuvers.

The introduction of 23-gauge vitrectomy instrumentation by Dutch Ophthalmic USA (Exeter, NH) and other manufacturers has facilitated the performance of vitrectomy with more rigid instrumentation but still provides the possibility of sutureless wound closure.

I performed a single-center, retrospective study to assess the safety and efficacy of the Dutch Ophthalmic USA 23-gauge vitrectomy system as a treatment modality for a variety of vitreoretinal pathologies.

MATERIALS AND METHODS

The study included 204 eyes with a wide range of retinal pathologies. All eyes were treated using the 23-gauge vitrectomy system. All patients received three drops of moxifloxacin (Vigamox, Alcon) preoperatively and then underwent standard three-port vitrectomy.

Patients were followed for a minimum of 3 months. Outcome measures included complications, postoperative intraocular pressure (IOP), anatomic restoration, and conversion to 20-gauge vitrectomy.

RESULTS

Diagnoses at the time of surgery included retinal detachment in 38 eyes, diabetic tractional retinal detachment in 53 eyes, diabetic vitreous hemorrhage in 65 eyes, macular hole in 26 eyes, macular pucker in 10 eyes, diabetic cystoid macular edema in five eyes, branch retinal vein occlusion with hemorrhage and epiretinal membrane in three eyes, peripapillary choroidal neovascular membrane in one eye, and subfoveal hemorrhage in three eyes.

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Significant complications occurred in 13 of the 204 eyes (6.37%). Complications included four vitreous hemorrhages, three peripheral retinal tears, three recurrent retinal detachments, two cases of cataract formation, and one occurrence of endophthalmitis. Minor complications included minor subconjunctival hemorrhage in 22 patients (10.78%) and subconjunctival gas in six (2.94%).

Mean postoperative IOP was 13 mm Hg (range, 4–32 mm Hg). Three patients had IOP of 5 mm Hg or less in the operated eye on postoperative day 1. No patient experienced wound leak, demonstrated positive Seidel sign, or required placement of a suture.

In 11 patients (5.39%), conversion to 20-gauge vitrectomy was necessary. All but three patients had successful anatomic restoration with a single operation.

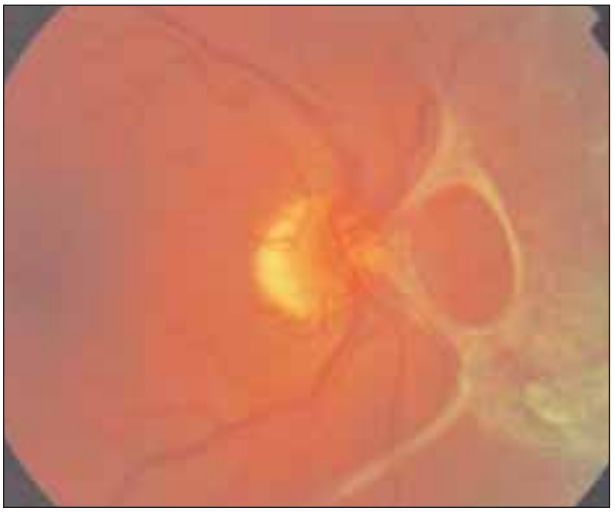

Figure 1. Preoperatively, extensive tractional changes along both arcades are seen, extending into the superior nasal periphery.

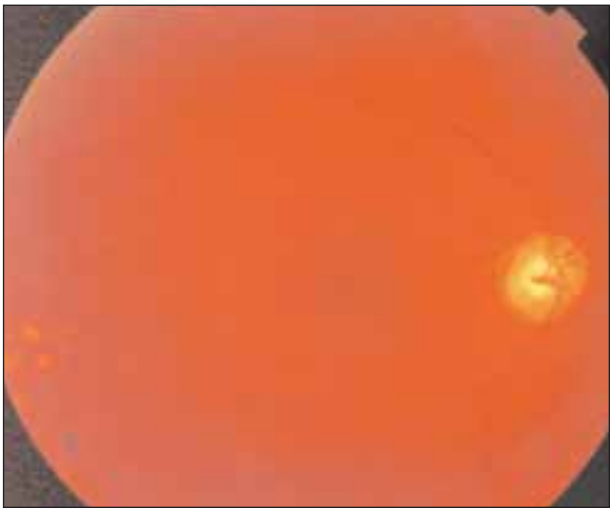

Figure 2. Postoperatively, the retina returned to its normal architecture, and the patient had an unremarkable and quiet recovery.

CASE REPORT

A 29-year-old male with 19 year history of significant proliferative diabetic retinopathy progressed to a significant premacular hemorrhage and tractional retinal detachment despite adequate and extensive laser photocoagulation. There were extensive tractional changes along both arcades that extended into the superior nasal periphery (Figure 1).

Sclerotomies were placed at the 2-, 8- and 10-o'clock meridians using the two-step method (see Discussion herein). The cannulas at the superior sclerotomy sites were facing the surgeon following placement because of the beveled entry incision. A core vitrectomy was performed. The large fibrovascular membrane was freed by delamination, including the superonasal quadrant, with horizontal scissors. The fibrovascular tissue was then removed en-bloc with the vitreous cutter without iatrogenic tear or wound modification due to instrument tensile strength.

The superonasal fibrovascular tissue was easily approached from the temporal incision, and the cannula returned to its original insertion position without wound leak despite significant intraoperative flexion. The retina returned to its normal architecture after surgical intervention, and the patient had an unremarkable and quiet postoperative course (Figure 2). No postoperative cycloplegia was required due to the small incision and cannula system, which reduces the trauma to the ciliary body seen with larger-gauge instruments.

This case provides an excellent example of the versatility of 23-gauge surgery. The instruments allow extensive resection, yet provide a self-sealing incision and rapid recovery with minimal postoperative inflammation.

DISCUSSION

The intermediate 23-gauge instrumentation seems to offer what one might call the best of both worlds, combining advantages of the thinner 25-gauge and the standard 20-gauge size instruments. Like 25-gauge instrumentation, the 23-gauge allows sutureless incision closure, reducing surgery time and improving patient comfort. Also, patients do not require as much postoperative medication because their eyes are less inflamed. Visual rehabilitation time appears to be improved. On the other hand, with a full range of instruments available, 23-gauge provides the ability to address a wide range of surgical indications similar to 20-gauge instrumentation. This combination of features makes 23-gauge in my opinion the most valuable of all the gauges.

The instruments are rigid enough to facilitate almost any surgical task. Since adopting 23-gauge instrumentation approximately 2 years ago I have seldom had to use 20-gauge instruments. I do convert to 20 gauge for silicone oil injection as a matter of preference to save time because of the high viscosity of 5,000-centistoke oil, although the silicone oil could also be injected through a 23-gauge cannula. Also, use of a fragmentation needle is not possible through the 23-gauge metal cannula, so if that instrument is called for, conversion to 20-gauge is necessary.

The infusion flow rate with 23-gauge instrumentation is better than with 25 gauge, although not as good as with 20-gauge, because flow is dependent on the radius of the instrument. This is an acceptable compromise and provides an improvement over 25-gauge flow characteristics.

I use the two-step insertion system that is offered by Dutch Ophthalmic. In the two-step procedure, an angled

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blade is used first to create the incision, followed by insertion of the trocar and cannula. In the one-step procedure, the cannula and blade are all one piece and are inserted simultaneously. Some surgeons say the two-step procedure is more difficult, but I found the learning curve to be short and the incision as easy to find and access. In addition, the two-step procedure provides a more stable wound.

I like the two-step insertion because the angled blade creates a reproducible beveled incision. This type of wound construction, like a clear corneal cataract incision, allows the creation of a wound that is consistently self-sealing. In my experience, the wounds created with the one-step system do not appear to be as stable or, more important, as reproducible. My experience has been that many wounds created with 23- or 25-gauge one-step systems require some securing or suturing at the close of surgery.

With the two-step technique, stability of the wound at the close of surgery has not been a problem. I am preparing a manuscript for submission to a peer-reviewed journal on this issue, detailing the difference between one- and two-step systems and the need for suture placement.

CONCLUSIONS

Once retinal surgeons gain experience with the variety of gauges now available for vitrectomy instrumentation, in my opinion, the majority will gravitate toward 23-gauge. This is because of the quality and breadth of instrumentation available, and the variety of surgeries it facilitates with no need of suture closure.

The 23-gauge instrumentation provides an effective and safe alternative for sutureless surgery in a wide range of retinal pathology. Prophylaxis with a broad-spectrum antibiotic preoperatively may reduce but not eliminate the risk of endophthalmitis. The properties of the intermediate gauge seem to offer advantages over the other sizes of instrumentation. ■

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