

Transconjunctival Sutureless 23-gauge Vitrectomy For Diabetic Retinopathy

The small-gauge vitreous cutter can be used as a multitask tool.

BY MIROSLAV KACERIK, MD

The indications for use of transconjunctival sutureless vitrectomy (TSV) in diabetic retinopathy (DR) have expanded as instrumentation has improved in recent years. The initial indications for 23-gauge TSV were limited to macular surgery for diabetic macular edema (DME) and traction macular edema. However, as the industry has steadily improved the technologies for TSV in the years since its introduction, we now have better trocar valved cannulas that allow us to ensure truly watertight closure of scleral wounds postoperatively. We also have improved instrumentation, including better vitreous cutters and a wider selection of instruments to choose from, such as pics, scissors, forceps, and valved cannulas for use in smaller-gauge surgery.

With this enhanced small-gauge surgical armamentarium, we can now treat patients with complicated proliferative DR (PDR), including eyes with vitreous hemorrhage, preretinal hemorrhage, epiretinal membrane (ERM) in PDR, traction retinal detachment, and combination traction-rhegmatogenous retinal detachment.

TSV IN DR

Several authors have reported that 23-gauge TSV is as effective for management of PDR as 20-gauge vitrectomy.^{1,2} Issa and colleagues² found that 23-gauge TSV was associated with a lower rate of retinal break formation than 20-gauge vitrectomy. This is at least in part due to the protection that the trocar cannulas provide for the peripheral retina. In addition, it appears that 23-gauge TSV is not associated with a higher rate of endophthalmitis than 20-gauge vitrectomy.¹ Endophthalmitis was seen as a problem in the early years of TSV, but with the improved trocar cannulas now available the scleral wounds seal very

well at the end of surgery and are truly watertight.

There are several distinct advantages of TSV 23-gauge as compared with 20-gauge vitrectomy, not only in surgery for DR but for many types of posterior segment diseases. With 23-gauge wounds there is less surgical trauma to the conjunctiva and no need to suture the sclera. The elimination of sutures results in a reduction of operation time, less postoperative discomfort for patients, and reduced time to visual recovery because there is no suture-induced astigmatism.

SURGICAL ALGORITHM

In DR surgery the surgical algorithm is somewhat different from standard vitrectomy. The first step is to obtain a complete sectioning or truncation of the posterior vitreous cortex (PVC), which we may find to be completely adherent to the retina, or partially or completely detached. When the PVC is completely or partially adherent to the retina, we must perform segmentation and delamination of ERMs in order to have the possibility to create a complete PVD. Only after this is accomplished can we complete the vitrectomy.

A 23-gauge system is an advantage in surgery for PDR because it can be used as a multitask tool. With 20-gauge vitrectomy, the surgeon often had to work with 2 hands, with scissors in 1 hand, forceps in the other. Therefore we needed a separate light source, such as a chandelier illumination system. Now we can work with illumination in the nondominant hand and just the 23-gauge vitrectomy probe in the dominant hand. In addition to its cutter function, the probe can be used as pic, scissors, forceps, and a valved cannula to remove blood from the retina.

The versatility of the 23-gauge probe comes from its



Figure 1. The first step in PDR surgery is sectioning and truncation of the PVC to eliminate any anteroposterior traction.



Figure 3. After changing to the peristaltic pump, the cutter is used like forceps to pull on the ERM for complete removal of the membrane.

small gauge and the placement of the cutting port near its distal end, allowing the surgeon to work very near the retina. Because it is narrow, the probe can be used to engage membranes, and in this way it can be used in place of pic or scissors. With the larger 20-gauge cutters we could not risk coming close to the retina, so we had to exchange instruments through the sclerotomies and use actual pic or forceps as supplementary tools.

Modern 23-gauge vitrectomy systems also provide good fluidic stability and a resulting reduction in surge. Therefore, even if we are working on an area of detached retina, we can operate near the surface and be sure we will not aspirate the retina.

SURGICAL CASE

A description of a typical surgical case can help to illustrate how 23-gauge TSV is used in patients with complicated PDR.

A 47-year old woman with a clear crystalline lens in place had PDR with mild vitreous hemorrhage and partial PVD. The Ophthalmic Small-incision Surgery System (OS3, Oertli Instrumente AG) with dual venturi and peristaltic pumps was used for the surgery. Instrumentation



Figure 2. With the venturi pump of the Oertli OS3 selected, the cutter probe is used to clean up periretinal blood like a valved cannula.



Figure 4. Staining with a combination of trypan blue and brilliant blue facilitates cutting of the ILM with a pic and grasping with forceps for complete removal.

included valved trocar cannulas and the 23-gauge vitrectomy probe (both Oertli Instrumente AG) used as a multitask surgical tool.

In surgery, we found that the vitreous was adherent to the retina at several points. The optic nerve and retinal vessels were attachment points for glial proliferation. The first surgical step was sectioning and truncation of the PVC to eliminate any anteroposterior traction (Figure 1). The Landers contact lens system (Ocular Instruments) allowed good axial and lateral resolution of the transparent PVC during these maneuvers. With the venturi pump selected, the cutter probe was used to clean up periretinal blood like a valved cannula (Figure 2). The cutter probe

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was then used like scissors and pic to perform segmentation and delamination of ERM above the optic disc. After selection of the peristaltic pump, the cutter was used like forceps to pull on the ERM for complete removal of the membrane (Figure 3). The same procedure was used to remove further ERM along the vasculature.

The aim of these maneuvers was to eliminate any point of anteroposterior traction caused by PVC in order to obtain a complete PVD. Once this was accomplished, we could proceed to complete removal of the peripheral vitreous using the Landers 30° contact lens. Hemorrhagic vitreous was easily cut and aspirated. The pathologic internal limiting membrane (ILM) was stained with a combination of trypan blue and brilliant blue dye. This staining facilitated cutting of the ILM with a pic and grasping with forceps for complete removal (Figure 4).

Laser photocoagulation was applied at the end of the case with the aim of avoiding recurrent hemorrhage. No tamponade was used in this case.

Postoperatively, the best corrected visual acuity of the patient was 0.2 logMAR (20/32), improved from 1.3 logMAR (20/400) preoperatively. She had no recurrent hemorrhage, and at the last follow-up examination (1 year after surgery) there was no significant cataract. During this period the patient had maintained optimal metabolic control.

CONCLUSION

The maturation of 23-gauge TSV instrumentation and associated technology has allowed surgeons to address even complicated cases of PDR with a sutureless surgical approach. Improved trocar cannulas ensure watertight wound closure and rapid visual rehabilitation. Newly designed vitreous cutters act as multitask tools, allowing the surgeon to work primarily with 1 instrument in 1 hand, thus reducing surgical time and wound manipulation. These advances allow us to bring the advantages of sutureless surgery to more of our patients, decreasing surgical recovery times without sacrificing any of the safety or efficacy of previous surgical modalities. ■

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