

Current Management of Giant Retinal Tears With Proliferative Vitreoretinopathy

BY ROHIT ROSS LAKHANPAL, MD, FACS

Proliferative vitreoretinopathy (PVR) is a late complication of vitreoretinal surgery and is the leading cause of failure of primary surgery. The clinical presentation of PVR involves fibrocellular membranes proliferating on both surfaces of the retina and anteriorly at the vitreous base. However, when a giant retinal tear is concurrently present, diffuse proliferation is more likely to result in a closed-funnel configuration because retinal contraction is unrestrained after the flap tears along the posterior margin of the vitreous base. Several associated clinical findings in giant retinal tears can predispose to the development of PVR. The extensive dispersion of pigment in the vitreous and on the retinal surface suggests the migration of retinal pigment epithelial (RPE) cells, which can increase the potential for the development of PVR.

Before the use of perfluorocarbon liquids, giant retinal tears were managed using an expanding gas bubble and scleral buckling, or with vitrectomy and fluid-gas exchange with the patient prone. The repositioning of the posterior flap of the giant tear was unpredictable. Thus, the potential for a higher rate of PVR was increased; in one large series,¹ PVR developed in 58% of eyes. Even in the era of perfluorocarbon liquids, the incidence of PVR is higher than that following conventional retinal detachment surgery.² In most recent series, the rate of PVR ranges between 12% and 15% of eyes.^{3,4}

The reasons for this higher rate of occurrence are unclear, but several factors may contribute to a greater propensity to develop periretinal proliferation in giant retinal tears. Patients with giant retinal tears tend to be younger. A giant retinal tear exposes a large area of bare RPE cells that can migrate from the subretinal space through the large retinal opening into the vitreous. The increased access of exposed RPE cells allows greater dispersion of the cells into the vitreous, potentially increasing the risk of proliferation.⁵ A greater



amount of thermal treatment (cryotherapy or photocoagulation) is required to treat a large retinal break, resulting in a greater breakdown of the blood-retinal barrier. Thus, although high rates of final retinal reattachment are achieved in giant retinal tears (greater than 95%), there is still a higher rate of reoperation compared to routine rhegmatogenous retinal detachments to achieve this final rate.

SCLERAL BUCKLING FOR PVR IN GIANT RETINAL TEAR DETACHMENT

Although the role of scleral buckling is controversial in the management of giant retinal tears without PVR, I advocate the use of scleral buckling in giant retinal tears with PVR. The role of the scleral buckle is to relieve the residual tractional forces along the vitreous base and to reduce any circumferential traction caused by the PVR process. The scleral buckle should be placed to support the vitreous base in the area where the retina is not torn. The scleral buckle does not need to support the posterior edge of the giant tear because no vitreous traction is present. Generally, I prefer using a Type 42 band with a low-lying placement as the first step in the surgery. The height of the buckle should be adjusted for a low, broad elevation. The band should be tightened so that the posterior slope of the buckle can still be visualized, facilitating the application of endophotocoagulation during surgery or, when necessary, postoperative laser photocoagulation along the posterior slope of the buckle. A high scleral buckle is not desirable, as it may result in radial folds because of the reduced circumference of the globe; this should be avoided.

SMALL-GAUGE VITRECTOMY IN PVR ASSOCIATED WITH GIANT RETINAL TEAR DETACHMENT

Recent advances in small-gauge vitreoretinal surgical systems have greatly expanded the surgical indications for 23-gauge and 25-gauge surgery. Prior to these improvements (improved fluidics, improved stiffness of instrumentation, cutter port placement closer to the tip, increased cut rates to 5000 cuts per minute), I was using 20-gauge instrumentation for these challenging cases. Manipulation of the globe with 25-gauge instruments was challenging because the instruments were too flexible. With the new 25-gauge systems, however, movement of the globe and scleral depression to see the periphery is easy.

I now strongly advocate small-gauge surgery with wide-angle viewing systems as it provides efficient vitreous removal with minimal traction on the detached retina and safe shaving of the vitreous base. The port is located close to the tip of the cutter, so I can safely dissect under membranes and use it as a pick, an aspirator, or forceps, and because it is small, we can easily maneuver around membranes. I personally prefer the 25-gauge cutter for these cases because of the easy maneuverability and tip size. The high-speed cutter (5000 cpm) with duty cycle control reduces traction when shaving membranes from the vitreous base. The need for ancillary instruments is reduced, so fewer instruments move in and out of the eye in these complex cases, theoretically resulting in fewer sclerotomy tears and less vitreous incarceration.

In surgical management of giant retinal tears associated with rhegmatogenous retinal detachment with PVR, I address the situation in the following manner:

- In most cases I place a low-lying Type 42 band scleral buckle to support the vitreous base.
- If the media are relatively clear, I do not remove the lens.
- If there is a media opacity obstructing my visualization, I will perform a lensectomy prior to addressing the PVR. Next, central and peripheral 25-gauge vitrectomy with vitreous base shaving and scleral depression must be performed in a meticulous manner.
- I employ the highest cut rate possible (5000 cpm) with relatively low vacuum, which also allows removal of

preretinal membranes and tissue on the retinal surface without the need for other instrumentation.

- I often inject steroid to highlight the peripheral vitreous prior to shaving. Injection of perfluoro-octane will then flatten the retina and allow safe removal of posterior star folds and PVR.

- I perform endophotocoagulation to the base of the scleral buckle in attached retina and to the edge of the giant retinal tear.

- To prevent slippage of the giant retinal tear once the perfluoro-octane is replaced by air, I perform a direct perfluoro-octane-to-silicone oil exchange by having my assistant inject silicone oil while I concurrently remove the perfluoro-octane.

I currently use both the Constellation Vision System (Alcon Laboratories, Inc.) and the Stellaris PC (Bausch + Lomb), having one in the hospital in which I perform surgery and another at my ambulatory surgery center. I have found that 25-gauge surgery is incredibly efficient with both of these systems for these challenging cases of giant retinal tears with PVR. ■

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