Surgery for Retinal Detachment With Giant Retinal Tears: An Update on Surgical Approaches

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Retinal detachments (RDs) associated with giant retinal tears (GRTs) often represent challenges for vitreoretinal surgeons because they are frequently accompanied by elements that complicate their management. These include location and extension of the GRT itself (Figure 1) and underlying proliferative vitreoretinopathy (PVR).

THE SCLERAL BUCKLING APPROACH

For many years scleral buckling surgery was the standard procedure to repair rhegmatogenous RDs (RRDs), but pars plana vitrectomy (PPV) has displaced buckling as the more widespread procedure and has even become a commonly used approach for primary detachments.[1] There are studies showing that similar results can be obtained using buckling and PPV, and, further, that good results can be achieved using a combination of the techniques, called a vit-buckle procedure, for treating RDs, including cases with a GRT.[2-4]

We prefer to perform PPV without a scleral buckle and reserve the combination approach for RRDs that have a tear smaller than 180º, GRTs that are localized within the lower quadrants, anterior class (Ca) PVR, or cases with multiple lesions in the peripheral retina that can cause additional tears during vitrectomy. For these cases, we use a buckle with a type 41 or 240 band, being careful not to use excessive indentation that would allow fluid to migrate into the subretinal space.

HANDLING THE LENS

Broad peripheral vitreous shaving is easier in patients who are aphakic of pseudophakic. (Aphakia can make the use of ocular tamponade difficult, as the absence of the lens can allow the material to migrate into the anterior segment.) GRTs, however, often occur in young people with clear lenses.[1] In these patients, it is worth trying to preserve the lens. Careful surgery assisted by a band can help to avoid marked opacification of the lens. It is our preference to reserve lens removal for cases of preexisting or iatrogenic cataract. In these cases, we perform a combined phaco-vitrectomy with IOL implantation to improve both postoperative vision and retention of tamponade within the vitreous cavity. IOL calculations

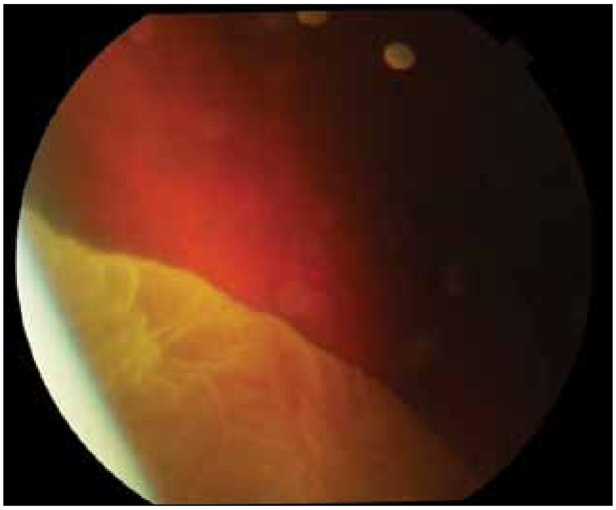

Figure 1. Giant tear over 180º accompanied by retinal stiffness. Pigment epithelium is shown uncovered in temporal quadrants in the left eye of a 43-year-old pseudophakic woman.

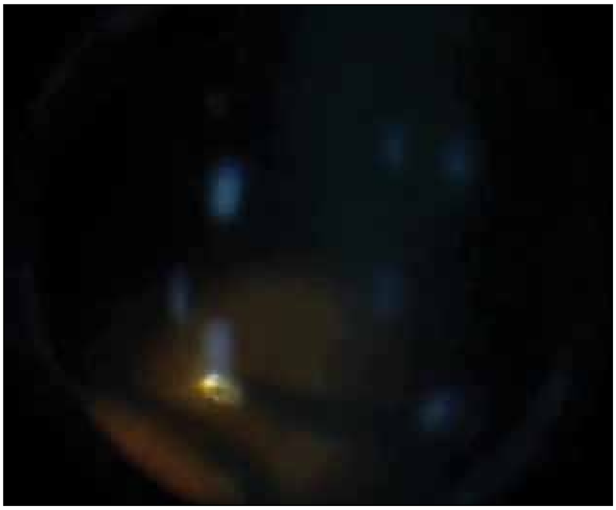

Figure 2. Much of the success of the surgery depends on proper approach to the tear edges and vitreous base.

Figure 3. Laser must be applied in at least 4 confluent rounds at the edges of the tear and, if necessary, in the insertion of the vitreous base around 360º.

should be performed prior to surgery, even if phaco is not planned. We reserve lensectomy for cases with extensive Class Ca PVR that can compromise the success of surgery.

PPV INSTRUMENTATION

Since the introduction of 25- and 23-gauge instrumentation by Fujii[5,6] and Eckardt,[7] respectively, there are multiple systems available for these procedures. There is a continued interest in 20-gauge instrumentation because its stiffness allows more effective maneuvers in the extreme periphery. Additionally, the faster speed of vitrectomy with 20-gauge instrumentation has been cited as a reason for this preference. The advantages of 23-, 25-, and even 27-gauge systems include high cuts rates (from 5000 cpm to 7500 cpm) and optimized cutter designs that allow surgeons to get closer to the retina more safely. The smaller gauge vitrectomy systems also feature more stable fluidics, generating minimal turbulence within the vitreous cavity and reducing the incidence of lens opacification in longer procedures.

In terms of visualization during surgery, wide-angle lens systems allow excellent surgical visualization of the retinal periphery even without optimal mydriasis.

Generally we prefer to use 23-gauge instrumentation because this gauge has the advantages of small-gauge surgery while the stiffness and procedure speed resemble 20 gauge. Additionally, the wide range of instruments that are available makes 23-gauge instrumentation ideal for GRT repair.

VITRECTOMY

We perform a standard 3-port vitrectomy, increasing the port count to 5 if we use chandelier lighting, which can be helpful with cases of advanced PVR that require complex bimanual maneuvers. Valved cannulas, which are available only with small-gauge systems, allow for safe exchange of instrumentation and infusion cannula insertion.

A core vitrectomy allowing the safe mobilization of the instruments is performed. Patients with GRTs routinely also have a posterior vitreous detachment (PVD), which is easily recognizable in the presence of a tear rolled on the posterior pole. Otherwise, PVD must be induced with the cutter using peristaltic aspiration to control the vacuum. PVD is an important step, ensuring that there is no remaining vitreous that, together with the migrating cells from the retinal pigment epithelium exposed by the tear (a phenomenon catalyzed by the inflammatory state that usually accompanies the RD), can result in the formation of membranes in the tear margins. This situation often threaten the stability of a well-repaired GRT posteroperatively.[8] The retina near the GRT is often highly mobile, so PVD should be started in the opposite quadrant. Any membranes encountered during surgery should be peeled, which can require a bimanual approach under heavy liquid.

Surgery continues with a centrifugal-direction vitrectomy in a posterior-anterior fashion to the periphery. A high cutting rate and low suction flow should be used to prevent mobility and iatrogenic tears (Figure 2).

If the GRT has irregular edges, they should be remodeled, ensuring that there is no vitreous adhesion. If severe PVR is present, the tear edges and peripheral flap must be brought up to the ora serrata using retinotomy and retinectomy to stabilize the retina and to prevent reproliferation produced by ischemia and neovascularization of devitalized peripheral retina. Such maneuvers should be performed with the cutter if small-gauge instrumentation is used. With 20-gauge instrumentation, vertical scissors should be used, and endodiathermy should be applied prior to cutting. Retinotomy and retinectomy are procedures that require a careful technique and expertise to avoid possible complications, including further iatrogenic tearing and hemorrhaging.[9]

A fluid-perfluorocarbon liquid (PFCL) exchange is then performed to flatten the retina. This is another step in the surgery that should be embarked upon carefully to prevent migration of PFCL under the retina. The eyeball should be tilted opposite to the tear (a degree of stiffness in the instrumentation is required for this maneuver), keeping the GRT in view. If excessive distension on the edges of the tear is seen, the surgeons should stop and extend the retinotomies as needed. If the GRT is greatly extended, it may be necessary to use silicone-tipped cannulas or other atraumatic instruments to achieve anatomic arrangement, unfolding the detached retina while filling the vitreous cavity safely with PFCL.

Confluent photocoagulation with at least 4 rows should be placed around the edge of the GRT up to the ora serrata. If necessary, laser can be continued 360° around the peripheral retina along the insertion of the vitreous base (Figure 3.).

TAMPONADE SELECTION

For superior GRTs with RD and without PVR, we prefer to use a mixture of SF_6 gas. If there is PVR and tears at any location except for 5, 6, and 7 o'clock, we use a mixture of C_3F_8. These patients should be able to position for at least 1 week. Finally, in detachments with severe PVR or tears in areas near 6 o'clock, we use 1000 centistoke silicone oil. We do not support the frequent use of so-called heavier-than-water tamponades, such as liquids and perfluorinated oils, because they provide inadequate protection against superior tears, are difficult to remove, and are toxic to the photoreceptors in the lower sectors of the retina.[10]

When using silicone oil, we perform a direct PFCL-silicone oil exchange, which can be effective for preventing migration of liquid toward the posterior pole through the edge of the tear. When using a small-gauge system, the irrigation line should be removed and oil injected directly with the help of the assistant while aspirating PFCL with a silicone-tipped cannula. It is important to carefully extract each remaining drop of PFCL drop once the vitreous cavity is filled with oil.

If gas is being used, a PFCL-air exchange is performed, aspirating the liquid level trapped between the PFCL-air interface. This will prevent migration of PFCL to the posterior pole through the tear. The gas is then injected. When valved cannulas are used, a vent must be attached to the system to maintain a constant and safe intraocular pressure. Upon cannula removal, it is important to ensure that the incisions are watertight. If necessary, a transconjunctival 8-0 polyglycolic acid suture is placed.

CONCLUSIONS

GRTs with RD are often complex cases. With the wide variety of instrumentation that is now available, our results in these procedures have improved to a level that would have been unthinkable only a few years ago. The approach to these cases depends largely on the particular situation and surgeon preference. The pearls described above have enabled us to improve visual outcomes for our patients who present with this sight-threatening condition. ■

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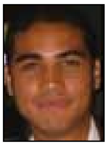

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