Applying Modified Perfluorocarbon-perfused Vitrectomy to a Diabetic Retinal Detachment Case

BY MICHAEL D. OBER, MD

In retina surgery, skill and technique are both important factors in determining outcomes. In publications that we read, at conferences we attend, and in conversations we have with our retina colleagues, we can gain insight into specific techniques that can change the way we perform one or more steps in a surgical procedure.

In this issue of Retina Today, Michael D. Ober, MD, describes the details of a technique that he has used for complicated diabetic vitrectomy. He explains the factors that guide his decision-making process, and he discusses the rationale for using particular surgical tools with this technique.

We extend an invitation to readers to submit surgical pearls for publication in Retina Today. Please send submissions for consideration to Dean Eliott, MD (deliott@doheny.org), or Ingrid U. Scott, MD, MPH (iscott@psu.edu). We look forward to hearing from you.

- Dean Eliott, MD; and Ingrid U. Scott, MD, MPH

In several publications, Hugo Quiroz-Mercado, MD, described a modified technique for perfluorocarbon-perfused vitrectomy for repair of complicated retinal detachment and vitreous biopsy. I have had the good fortune of performing several of these procedures with Dr. Quiroz-Mercado at the Hospital Dr. Luis Sánchez Bulnes in Coyocan, Mexico. It is difficult to duplicate this technique exactly in the United States because perfluorocarbon liquid is very expensive and available only in relatively small amounts. I have successfully modified some of the techniques inherent to perfluorocarbon-perfused vitrectomy for complicated cases in my own practice using the limited quantities commercially available. The concept behind this technique is to provide broad countertraction on the relatively delicate retina with perfluorocarbon liquid. This allows peeling of preretinal membranes with a decreased need for cutting individual points of traction. The perfluorocarbon liquid also provides a measure of dissection itself by flowing between the retina and overlying membranes. It tends to suspend the elevated membrane edge as well, thereby allowing for easy regrasping. Furthermore, operating under perfluoro-
carbon liquid almost always means operating on attached retina. The major advantage of true perfluorocarbon-perfused vitrectomy over the modified technique is the ability to use instruments with suction such as the vitreous cutter. In this article, I explain the technique further via a particularly unusual and difficult case that I encountered. This technique is also similar to what is described by J. Fernando Arevalo, MD.4,5

PREOPERATIVE CONSIDERATIONS
A 29-year-old woman presented with bilateral macula-off retinal detachments combined with extensive peripheral retinoschisis and multiple outer and inner layer holes (Figures 1-3). She also had advanced diabetic retinopathy with extensive peripheral retinal neovascularization that seemed to be concentrated around the large, mostly outer-layer holes. As expected with her young age, the hyaloid was attached posteriorly.

I anticipated that it would be extremely difficult to dissect the hyaloid and fibrovascular membranes from the partial thickness underlying inner retinal layer. Any attempts at countertraction with a lighted pick would likely leave many more holes in the inner retina. Thus, my goal was to use the broad holding power of perfluorocarbon liquid to stabilize the inner retina while I grasped the hyaloid and proliferative membranes with forceps.

TOOL SELECTION
A true perfluorocarbon-perfused vitrectomy is very difficult at my institution because liquid is extremely expensive and not available in the large quantity that would be required. The lack of continuous perfluorocarbon infusion limits my ability to use a vitreous cutter or any instrument that uses a sucking action, and so I used forceps in this case.

I first placed an encircling No. 41 band attached with a No. 70 sleeve. It is extremely rare for me to use an encircling buckle in an eye with advanced diabetic retinopathy because of the risk of anterior segment ischemia; however, in this case I wanted to support the vitreous base broadly in the setting of multiple inner and outer layer holes with peripheral proliferative retinopathy. I chose 20-gauge instrumentation for two reasons. First, the scleral buckle required opening the conjunctiva. Second, I wanted our full complement of instruments including curved horizontal scissors avail-

Figure 1. Right eye at initial presentation with retinal detachment, retinoschisis, and proliferative retinopathy.

Figure 2. Preoperative photo of left eye with retinal detachment, retinoschisis, and proliferative retinopathy.
While there are curved horizontal scissors available for small incision vitrectomy, the cannula/trocar system does not allow for an angle between the shaft and blades, thus limiting their effectiveness.

**CORE VITRECTOMY**

I performed a limited core vitrectomy and then injected triamcinolone (Triesence, Alcon Laboratories, Inc.) over the optic nerve, hoping to stain the posterior hyaloid. I then elevated the posterior hyaloid under fluid in a very limited area around the optic nerve and partially in the macula.

I then injected the perfluorocarbon liquid (Perfluoron, Alcon Laboratories, Inc.) into the opening in the posterior hyaloid, filling nearly three-quarters of the eye. The hyaloid was mildly stained with triamcinolone. The posterior hyaloid was grasped with forceps, elevating it from under the perfluorocarbon liquid. The perfluorocarbon liquid helped to dissect the hyaloid away from the retina and also successfully held the retina in a broad fashion flat against the underlying tissues. As the process was extended peripherally, I was able to peel the proliferative membranes away from the inner wall of the retinoschisis.

Some areas remained elevated despite the perfluorocarbon liquid because of the fluid trapped within the schisis cavity; the perfluorocarbon, however, held back the inner retina to a level sufficient to allow removal of the preretinal membranes using only forceps. I was unable to remove a small area of residual proliferative tissue surrounding the 12-o’clock position; however, it was peripheral to the large outer hole, and I was able to place laser in a panretinal fashion without difficulty. Additional laser was concentrated around all visible inner- and outer-layer retinal holes. Some of the trapped fluid was confirmed to be schisis fluid; I still had fairly good laser uptake despite the obvious elevation of the inner retina.

**AIR-FLUID EXCHANGE**

An air-fluid exchange was then performed including removal of all perfluoro-
carbon liquid. Additional endolaser was placed to the ora serrata and then silicone oil was injected. I chose silicone oil for several reasons. The patient had multiple inner and outer retinal holes that were difficult to identify, and her vision in the fellow eye was poor (counting fingers). Additionally, the patient had three young children, so it was likely she would be unable to position adequately.

POSTOPERATIVE RESULTS

One week postoperative, uncorrected vision was hand movements with an excellent oil fill (Figure 6). She already began developing a posterior subcapsular cataract, but the view was quite good to the retina. There was shallow subretinal or intraretinal fluid mostly along the inferior arcades and shallowly in the macula, but the periphery and central macula were successfully reattached.

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