

Repairing TRDs Secondary to Diabetic Retinopathy



The lift-and-shave technique may be a game-changer in tractional detachments.

BY MARIA BERROCAL, MD

Diabetic retinopathy (DR) is the most common cause of tractional retinal detachment (TRD) and tractional and rhegmatogenous retinal detachment (TRRD). These detachments occur frequently in young phakic patients with poorly controlled diabetes and multiple comorbidities. Therefore they pose distinct challenges for the vitreoretinal surgeon.

In the past, various techniques, instruments, and maneuvers were developed to tackle these challenging cases and improve outcomes. The use of chandeliers and illuminated instruments was necessary for performing bimanual dissection techniques with forceps and scissors. Viscodissection was frequently necessary, and intraoperative complications including uncontrolled bleeding and iatrogenic breaks were frequent. These complications explain the frequently unsatisfactory visual and anatomic outcomes seen in the past.¹

The challenge of performing vitrectomy to repair TRDs lies in safely removing adherent fibrovascular tissue from the surface of thin ischemic retina without causing iatrogenic breaks. To accomplish this, optimal intraoperative visibility and control of bleeding are

paramount, as are instruments that can safely peel and cut abnormal tissue from the surface of the retina. Before the advent of 25- and 27-gauge platforms with valved cannulas, the vitrectomy probe could not be used in close approximation to the retina, and bleeding control was a challenge because intraoperative pressure fluctuations were common during exchange of instruments. Thus, surgical cases were

lengthy and required the availability of diathermy, plasmin, and hyaluronic acid, and often required corneal scraping for visibility. Reoperations were frequent, particularly in the most difficult cases.

The development of small-gauge vitrectors, particularly 27-gauge instruments with high cutting rates of 10,000 cuts per minute (cpm), has produced a tool that performs unlike

AT A GLANCE

- ▶ In the past, TRDs required the use of bimanual dissection techniques, requiring chandeliers and illuminated instruments, forceps and scissors. Complications including uncontrolled bleeding and iatrogenic breaks were frequent.
- ▶ The challenge of vitrectomy for TRDs is how to safely remove adherent fibrovascular tissue from the surface of thin ischemic retina without causing iatrogenic breaks.
- ▶ The lift-and-shave technique makes optimal use of all recent technological advances in vitrectomy, namely optimized machines with high cutting rates, high aspiration rates, IOP control, valved cannulas, and 27-gauge vitrectors.

any vitrector in the past. This technology, coupled with the use of valved cannulas, which allow working within a closed system with minimally fluctuating intraocular pressure (IOP), has dramatically simplified the surgical management of these difficult cases.

ENTER THE LIFT-AND-SHAVE TECHNIQUE

I developed the lift-and-shave technique for the management of diabetic TRDs after noting that 27- and 25-gauge vitrectomy probes can be used to cut and aspirate tissue on the surface of the retina in a controlled, safe manner (Video).² The goal in these cases is to safely remove all abnormal fibrovascular tissue causing traction on the retina.

I realized that the vitrectomy probe can be used as a combination forceps-scissors, and that the maneuvers we were used to performing bimanually could be executed with only the vitrectomy probe. The small diameter of the probe enables the surgeon to use it like a viscodissection cannula, entering between tight tissue planes. It can also be used to perform blunt dissection and to cut small adhesion bands in the same manner as vertical scissors.

Maximizing the potential capabilities of the vitrectomy probe has allowed most of my cases to be performed in a streamlined, sequential, efficient, and safe manner and without any ancillary instrumentation or chandelier illumination. I prefer to use a 27-gauge platform on the most difficult of cases, but 25-gauge systems can be used for simpler cases or by those not familiar with 27-gauge platforms. A description of my surgical approach follows.

Perform Core Vitrectomy

Core vitrectomy is performed, including removal of the peripheral vitreous around 360°. If the periphery is adherent and there is no rhegmatogenous component of the TRD, aspiration with the probe can be done to detach the hyaloid around the fibrovascular tissue in the periphery.

Separate the Remaining Tissue Plaque

Once all peripheral traction is relieved, separate the remaining tissue plaque by lifting the edges of the plaque with aspiration from the probe to find a tissue plane between the retina and fibrovascular tissue where the vitrectomy probe can be introduced. Gentle aspiration with the probe can be used to peel tissue from the retina. One advantage of the 27-gauge probe is that if there is significant resistance from strong adhesions the tissue falls back from the probe. This prevents inadvertent tearing of the retina. In this sense, peeling with the vitrectomy probe can be safer and more controlled than peeling with forceps.

Perform Blunt Dissection and Back Cutting

Once a plane is located, the vitrectomy probe is advanced with the opening facing anteriorly. Blunt dissection is carried

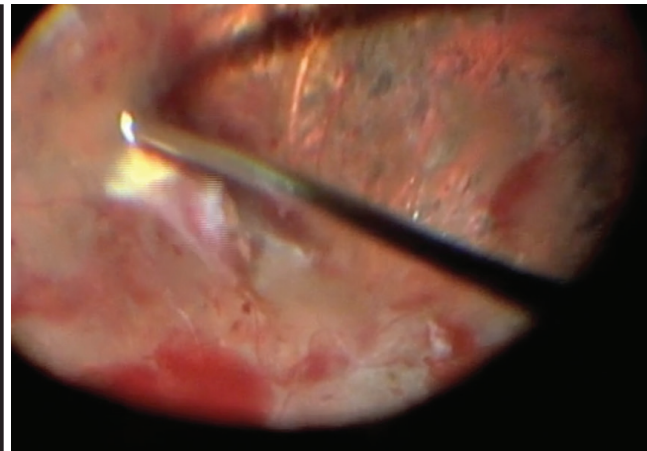


Figure 1. A 27-gauge vitrector is used in aspiration mode to grasp an edge of fibrovascular membrane and lift and peel the tissue.

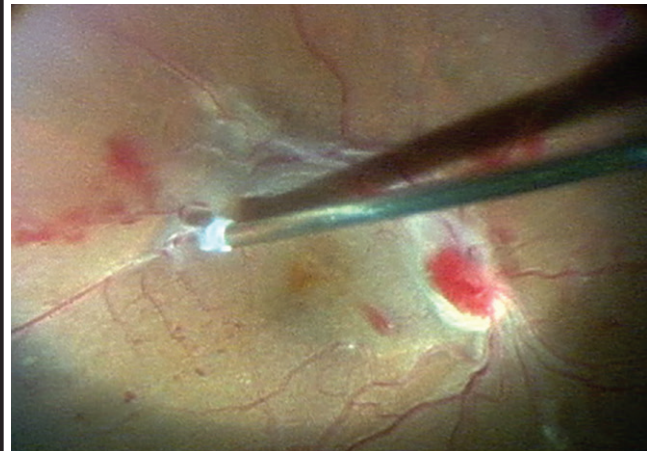


Figure 2. Shaving tissue over vessels using a 27-gauge vitrector.

out until significant resistance is encountered. At this time, back cutting can be done as the probe is withdrawn, thus segmenting tissue without the risk of cutting the retina. Any adherent bands encountered can be cut with the probe.

Lift and Shave

The vitrector is used in aspiration mode to grasp an edge of membrane or hyaloid and to lift and peel as soon as resistance is encountered (Figure 1). The footpedal is then shifted to cutting mode, and the lifted tissue is removed. This maneuver is sequentially repeated, together with blunt dissection, until only tissue over the optic nerve and around vessels remains. Tissue over vessels can be shaved in cutting mode with minimal aspiration (Figure 2). Tissue over the optic nerve can be peeled using suction with the vitrector at maximum aspiration.

During surgery, IOP is usually set at 30 mm Hg and raised if bleeding is encountered. Hemostasis is important to allow optimal visibility. This is achieved by raising the IOP, applying pressure with the vitrector over the bleeding vessel, or applying diathermy or continuous laser to the bleed. Cutting rate

is set at maximum, between 5,000 and 10,000 cpm, depending on what the system allows. I prefer controlling the aspiration rate with the footpedal and performing everything on linear mode.

In cases in which the fibrovascular tissue is adherent to the periphery and no tissue plane can be accessed, an alternate maneuver to begin dissection is to detach the fibrovascular frond over the optic nerve, removing the tissue and creating an opening with the cutter, then using the same dissecting techniques of lift and shave but from the inside out.

Final Steps

After all traction is relieved in the TRD, any blood on the surface is aspirated with the vitrector and laser panretinal photocoagulation is applied to the periphery, if needed. If traction over the fovea was present, then air-fluid exchange can be performed using fluid aspiration with the vitrector. In these eyes I leave the air as a tamponade and tell the patient to maintain prone position for 1 day to allow faster resolution of the TRD in the foveolar area. This has evolved as I have become more experienced with the capabilities of smaller-gauge vitrectors. Initially I used forceps for some steps and a soft tip needle for aspiration and air-fluid exchange. Now I use the vitrector instead of a soft-tip needle to peel epiretinal membrane and internal limiting membrane because it allows precise control during these maneuvers.

COMPLICATIONS WITH TRRDs

A rhegmatogenous component often complicates eyes with TRD. When a TRRD is encountered, dissection is more difficult because the retina is bullous and no countertraction is present when fibrovascular tissue is lifted. Iatrogenic breaks tend to occur more frequently. In these cases I perform more blunt dissection of tissue, and the lifting part of the technique is performed more gently. Shaving of

tissue over bullous detached retina can be done safely, particularly with a 27-gauge probe at 10,000 cpm. A beveled vitrector, which is now available in 27 gauge, is particularly useful for this because it allows the opening of the probe to engage tissue close to the retina. Detaching the hyaloid–fibrovascular tissue complex from the optic nerve is particularly useful in these cases.

Unlike in TRDs, if a rhegmatogenous component is present it is imperative to remove all fibrovascular tissue and all traction to allow retinal reattachment. I mark the retinal breaks with diathermy to facilitate visualization under air, and then I perform an air-fluid exchange. I apply continuous laser around breaks. In these cases I leave a long-acting gas tamponade, either perfluoroethane or perfluoropropane gas, at 15% concentration.

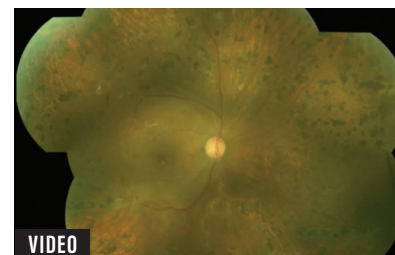
In monophthalmic patients or those who have limitations when it comes to prone positioning, silicone oil can be used and removed 3 to 6 months later.

Despite the usefulness of these techniques, there can be cases in which bimanual techniques and viscodissection are still necessary. These include eyes with fibrovascular tissue in the equator or periphery, or those with extremely adherent tissue on an ischemic retina, which can be seen in eyes with detachments of long duration.

ANATOMIC SUCCESS, VISUAL IMPROVEMENT

Recently I published a series of 42 consecutive cases of diabetic TRDs treated with the lift-and-shave technique using 25- and 27-gauge systems.² Anatomic attachment was achieved in all cases, and visual acuity improved 2 or more lines in 90% of eyes. An iatrogenic break was created during surgery in one eye, for which an SF₆ gas tamponade was used. Four eyes in the 25-gauge group required air-fluid exchange in the office due to nonclearing vitreous hemorrhage, and three eyes required reoperation because of

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epiretinal membrane formation.

Yousef J. Cruz-Iñigo, MD, and I also recently published a series of 12 eyes with TRRD managed with 27-gauge vitrectomy and the lift-and-shave technique. At 6 months follow-up, 92% of eyes attained visual acuity of 20/400 or better.³

A WORTHY OPTION

The lift-and-shave technique is a useful addition to our armamentarium of techniques for the repair of challenging diabetic TRDs. It makes optimal use of all recent technological advances in vitrectomy, namely optimized machines with high cutting rates, high aspiration rates, IOP control, valved cannulas, and 27-gauge vitrectors. The technique is a game-changer in our approach to challenging cases and facilitates elegant, expedient, streamlined, efficient, and safe repair of diabetic eyes with TRDs. ■

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