

Bimanual Vitreoretinal Surgery for Tractional Retinal Detachment Due to Proliferative Diabetic Retinopathy

Tools and techniques for a bimanual approach using 20- or 23-gauge instrumentation.

BY ELLIOTT SOHN, MD

In this issue of Retina Today, Elliott Sohn, MD, provides surgical pearls for performing bimanual vitreoretinal surgery for tractional retinal detachment due to proliferative diabetic retinopathy using 20- or 23-gauge instrumentation.

We extend an invitation to readers to submit pearls for publication in Retina Today. Please send submissions for consideration to Ingrid U. Scott, MD, MPH (iscott@psu.edu); or Dean Elliott, MD (dean_elliott@meei.harvard.edu). We look forward to hearing from you.



—Ingrid U. Scott, MD, MPH; and Dean Elliott, MD

Managing eyes with tractional retinal detachment (TRD) due to severe proliferative diabetic retinopathy (PDR) can be challenging for vitreoretinal surgeons (Figure 1). TRD from PDR, resulting from contraction of epiretinal fibrovascular proliferative membranes, requires surgery when it involves or threatens the macula or has a combined rhegmatogenous retinal detachment (RRD) component.

In bimanual vitreoretinal surgery, two instruments are used simultaneously to manipulate the same tissue inside the eye. This concept typically excludes the use of a single-function light pipe as one of the instruments, although this too can be used for manipulation. Due to the complexity of TRDs from PDR requiring surgery, bimanual technique can be advantageous to permit optimal visualization and to facilitate creation of dissection planes between the retina and fibrovascular membranes (FVMs) to reduce bleeding and iatrogenic complications.

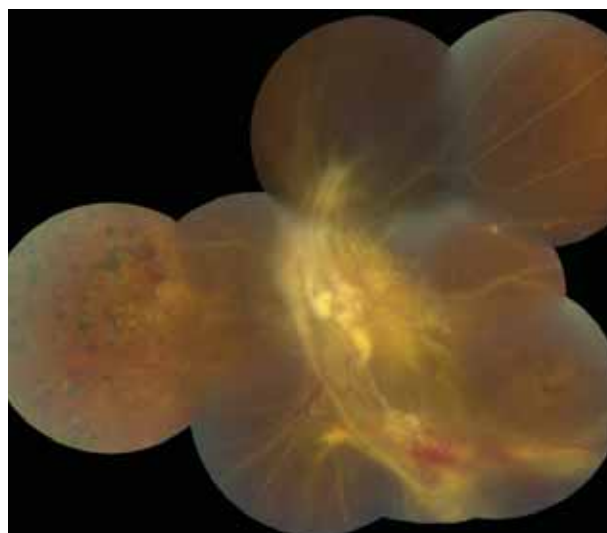


Figure 1. Left eye with severe TRD from PDR.

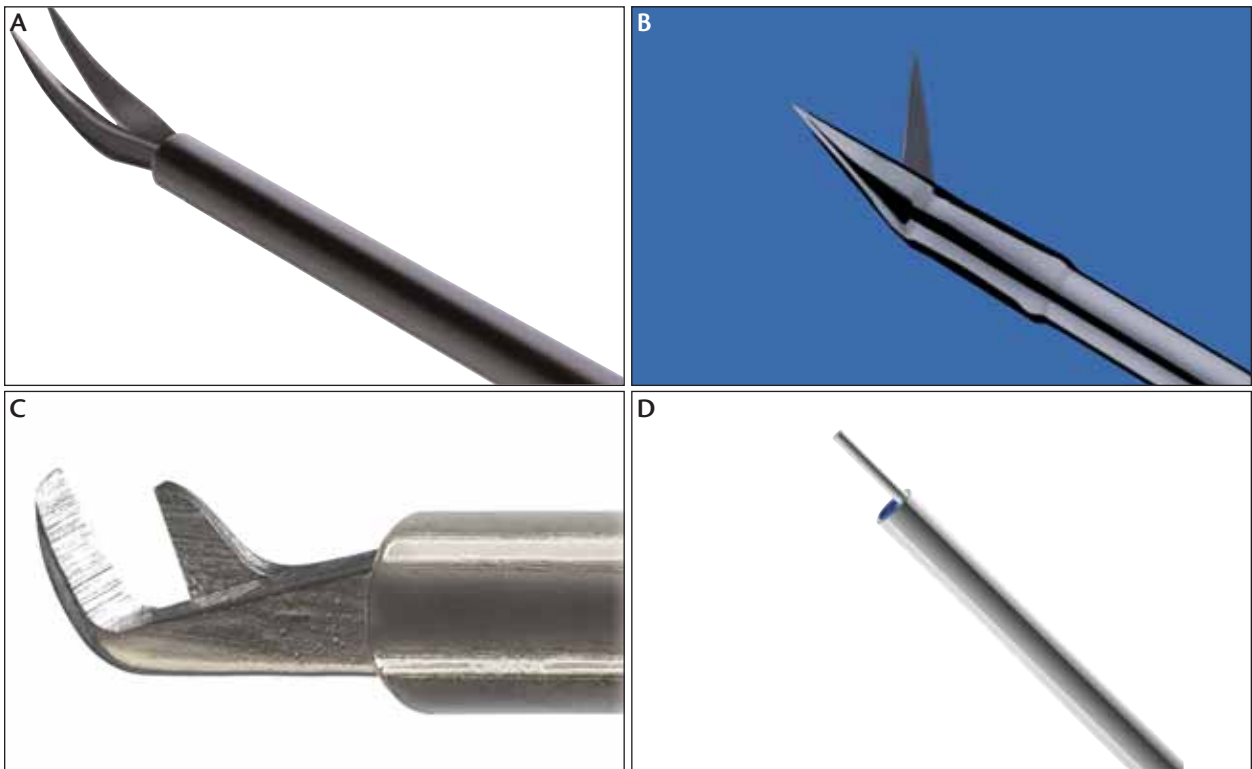


Figure 2. Curved scissors (A), horizontal scissors (B), vertical MPC scissors (C), three-function tissue manipulator (D).

For most TRDs with focal vitreoretinal adhesions (pegs), a light pipe and a curved scissors (Figure 2A), horizontal scissors (Figure 2B), or vertical membrane peeler-cutter (MPC) scissors (Figure 2C), an instrument that combines automated vitreous scissors and a hooked needle (Figure 2C), are usually adequate. For the most complex cases in which there are extensive FVMs, particularly broad sheets that are tightly adherent to detached, mobile, and atrophic retina prone to breaks, I typically employ bimanual surgery with a cutting device in one hand (vitrector or vertical, curved, or horizontal scissors) and a lighted instrument in the other (three-function tissue manipulator [Figure 2D], illuminated forcep, or illuminated pick).

This article discusses some tools and techniques to perform bimanual vitreoretinal surgery using either 20- or 23-gauge instrumentation. My experience is primarily with technology manufactured by Alcon Laboratories, Inc. (Fort Worth, TX); however, the principles should apply to any platform. Notably, many diabetic vitrectomies do not require bimanual vitreoretinal surgery because FVMs can often be removed with the cutter, curved or horizontal scissors used for delamination, and/or vertical scissors used for segmentation. These techniques depend on the surgical case, but I tend to use a combination of these instruments for the most difficult cases.

PEARLS FOR TRD SURGERY

In TRD surgery, it is important to 1) remove as much hyaloid and FVM from the retina as possible to eliminate associated vitreoretinal traction; 2) dissect a plane separating the retina and FVM to reduce the risk of iatrogenic breaks and bleeding; and 3) use just enough light to visualize the dissection but limit phototoxicity.

PEARLS FOR 20-GAUGE SURGERY

Vitreoretinal surgery with 20-gauge instrumentation is the traditional method for repairing TRDs. The range of instruments available for 20-gauge surgery is the broadest, as this modality has been around the longest. The larger caliber instruments allow increased stability for devices such as the reusable vertical MPC scissors and three-function tissue manipulator (endillumination, cautery, irrigation, and aspiration all in one handpiece; Figure 2D).

Although it requires a trained assistant to control the partially filled balanced salt solution (BSS irrigating solution, Alcon Laboratories, Inc.) syringe manually, the tissue manipulator is useful for elevating membranes to provide direct visualization for severing pegs or broad adhesions. Bleeding can be addressed immediately with the cautery integrated into the instrument. Care should be taken to avoid excessive instrument changes that can be associated with sclerotomy-related breaks (SRBs).

I have found that SRBs occur more often with the tissue manipulator, but this may be due to case selection bias. I reserve this instrument for the most difficult cases, which probably have a higher risk for SRBs regardless of the instrumentation used.

Bimanual 20-gauge surgery can also be performed using an illuminated infusion or chandelier lighting system, allowing dissection with forcep and cutter (or scissors). A chandelier lighting system works well with the scissors, but to reduce instrument changes and SRBs I use the cutter to excise tissue elevated with forceps. However, with this technique, I find the larger bore of the 20-gauge vitrector and the increased distance from the port to the tip of the cutter makes access to tight spaces more difficult than with the 23-gauge cutter.

PEARLS FOR 23-GAUGE SURGERY

A major advantage of 23-gauge vitrectors is that the mouth of the port is closer to the tip of the cutter (0.009 inch for 23-gauge vs 0.011 inch for 20-gauge cutters manufactured by Alcon); this, combined with the smaller caliber inherent in 23-gauge instruments, allows the surgeon access to the tight spaces typically encountered with TRDs. The combination of these two factors allows me to use 23-gauge surgery just as often for diabetics as 20-gauge surgery, if not more often. Although there currently is no three-function tissue manipulator available in 23-gauge technology, curved and vertical disposable scissors work well with 23-gauge trocars. Increasingly, my reliance on scissors has decreased with the smaller port distance and better ergonomics of 23-gauge vitrectors.

I use a chandelier lighting system for difficult cases that require bimanual surgery. This allows me to use forceps in one hand and a cutting device in the other. I have been impressed with Alcon's chandelier coupled with the Constellation System, which, when positioned correctly, allows excellent lighting for macula work in diabetics. I am careful to turn the chandelier off or remove it entirely

With a chandelier, it is ideal that at least one of the two instruments in bimanual surgery has the ability to pick membranes.

before air-fluid exchange, as light toxicity is more likely under air than under fluid. I favor a pick-forceps that can be used to find and dissect planes between the retina and FVMs and also to lift membranes for cutting. However, simple forceps can also work particularly well when the other instrument has a blunt end that can be used for dissection, such as vertical scissors or curved/horizontal scissors. With a chandelier, it is ideal that at least one of the two instruments in bimanual surgery has the ability to pick membranes.

CONCLUSION

Diabetic TRDs are traditionally repaired with 20-gauge vitrectomy technology, and the most complex cases are completed more easily with bimanual surgical technique. However, the advent of better chandelier lighting systems and the improved port ergonomics of 23-gauge vitrectors now allows more TRDs—even difficult cases—to have good postoperative outcomes with 23-gauge technology. Although some instruments are still missing from the 23-gauge armamentarium, such as a three-function tissue manipulator, continued advances in surgical equipment and techniques will hopefully yield better results with fewer intraoperative complications. ■

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