

Techniques in Retinal Surgery: Maybe Controversial, Maybe Not

A review of surgical techniques to enhance patients' visual outcomes after vitrectomy.

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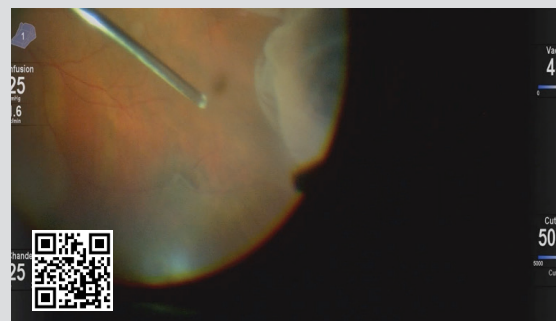
The execution of surgical techniques are highly dependent on the surgeons personal preferences, and many times surgeons perform the same surgery in different manners. However, there are many ways to achieve success in surgery, and one should perform techniques that provide the best results for him or her.

This article reviews certain surgical techniques that I have found helpful in vitreoretinal surgery. Some surgeons may view some of these steps as unnecessary to perform during vitrectomy. However, for surgeons who do decide to perform the steps discussed here, I also review some pearls and tricks that should help improve success with these maneuvers. Video links are provided so readers can see these techniques in action.

SCLERAL-DEPRESSED VITRECTOMY DURING RETINAL DETACHMENT SURGERY

Advances in technology in recent years allow surgeons to perform scleral-depressed vitrectomy in both phakic and pseudophakic patients (Video 1; eyetube.net/?v=onirr). Scleral-depressed vitrectomy allows peripheral vitreous shaving, which results in a more complete vitrectomy. When combined with peripheral laser treatment (see below), these techniques may alleviate the need for scleral buckling during vitrectomy surgery in many patients with primary

Video 1



rhegmatogenous retinal detachment.

Here are a few pearls and tricks to reduce the risks of these procedure, especially in phakic patients:

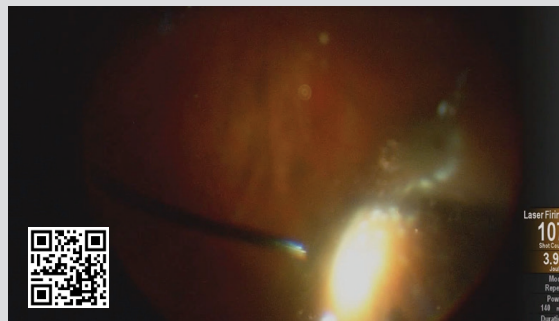
- Accurately measure the distance between the sclerotomy and the limbus. Always measure and do not estimate. In phakic patients this distance is usually 4 mm.
- Use of a chandelier lighting system helps to illuminate the peripheral retina and frees the surgeon's second hand, allowing him or her to perform scleral depression with their own free hand.
- Slightly decreasing intraocular pressure (IOP) may reduce the resistance felt during scleral depression and make it easier to perform.

- Always enter the eye and visualize the tip of the cutter first before starting scleral depression. If one depresses the sclera first, the depression may tilt the eye, and the surgeon may inadvertently hit the lens while entering the eye.
- If perfluorocarbon liquid (PFCL) is in the eye, release the depression slowly while moving the scleral depressor around the globe to prevent the induction of a vacuum effect that could lead to the suction of the PFCL through the break under the retina.
- When vitrectomy is performed in close proximity to detached mobile retina, lower vacuum may be applied to prevent iatrogenic breaks.
- Never perform scleral depressed vitrectomy anterior to the ora in a phakic patient: you will touch the lens.

360° SCLERAL-DEPRESSED PERIPHERAL LASER TREATMENT DURING RETINAL DETACHMENT SURGERY

Use of 360° scleral-depressed peripheral laser treatment may reduce the likelihood of patients developing peripheral retinal detachment from newly formed breaks during the postoperative period (Video 2; [eyetube.net/?v=oohij](#)). Ideally, laser should be applied from the posterior edge of the ora to the posterior edge of the anterior vitreous base (which is typically the location of the most posterior break). Light laser burns with short duration (200 ms) are applied in a scattered, nonconfluent fashion for 360°, avoiding heavy laser burns. If possible, the horizontal meridians should be avoided to prevent lasering the ciliary nerves, thereby decreasing the likelihood of postoperative pupillary dilation. In phakic patients, the use of a curved or directional lighted laser probe may be necessary to perform this procedure. Tamponade with C3F8 gas and face-down positioning for around 1 week may help decrease the rate of postoperative redetachment.

Video 2



“When vitrectomy is performed in close proximity to detached mobile retina, lower vacuum may be applied to prevent iatrogenic breaks.”

CHANDELIER LIGHT SOURCE

A chandelier light source is a useful tool to improve illumination during vitrectomy surgery. It also frees the surgeon's hand to perform scleral-depressed vitrectomy and allows bimanual dissection during diabetic vitrectomy. However, because chandelier illumination is an immobile light source, the constant illumination eliminates the retina's ability to recover from light exposure.

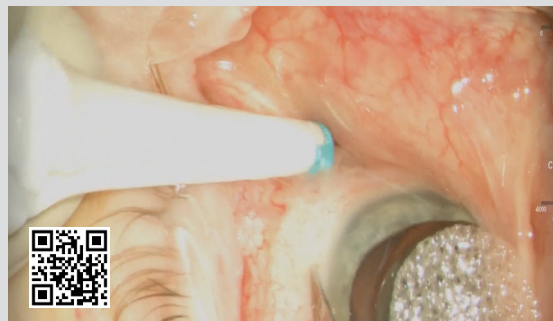
The following pearls may reduce the likelihood of phototoxicity while using a chandelier light source:

- Turn on the chandelier light only when needed, and do not use it during the entire surgery. Turn the chandelier light off when an endoilluminator is in the eye.
- Use the minimum light necessary to perform the task at hand, not maximum illumination.
- Avoid the use of a chandelier light source after retinal staining.
- Ensure that the chandelier light is not directly illuminating the center of the macula.

VALVED TROCAR SYSTEM FOR VITRECTOMY SURGERY

The use of trocar systems in vitrectomy surgery has improved outcomes by minimizing trauma to the conjunctiva during surgery and decreased the incidence of iatrogenic peripheral breaks caused by instruments entering and exiting the eye (Video 3;

Video 3



“The relationship of [intraocular pressure] to blood pressure may have a more severe impact in elderly patients and those who have atherosclerotic disease and/or diabetic retinopathy.”

eyetube.net/?v=edigo). The introduction of valved trocar systems further improved the surgical experience by creating a closed system for vitrectomy surgery, alleviating the need for plugs and allowing surgeons to decrease the flow of fluid during vitrectomy.

During the 20-gauge vitrectomy era, surgeons did not need to be concerned (as much) about perfusion of the optic nerve and retina during surgery because the system was not watertight, and fluid leaked around the sclerotomies. The valved trocar system minimizes the leakage of fluid during vitrectomy, and, therefore, it is paramount to monitor the optic nerve and retinal perfusion during the surgery and adjust the IOP and/or patient's blood pressure accordingly.

It is important to note that, when patients are under sedation, their blood pressure may drop; the diastolic pressure may reach as low as 30 or 40 mm Hg. In a closed system with valved trocars, an IOP of 30 mm Hg may be too high compared with the blood pressure, resulting in a collapse of the central retinal artery during the diastolic phase. If the IOP or the blood pressure is not adjusted accordingly, the retina will not perfuse during the diastolic phase—in other words, during half of the surgery—and this may lead to an adverse visual outcome for the patient. The relationship of IOP to blood pressure may have a more severe impact in elderly patients and those who have atherosclerotic disease and/or diabetic retinopathy. ■

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