

The 20-gauge Self-sealing Scleral Tunnel

This technique provides the benefits of sutureless surgery without the limitations of small-gauge instrumentation.

BY ZACHARIAH KOSHY, MBBS, FRCS, MRCO, DNB

Sutureless vitrectomy is fast becoming the accepted standard with well-established benefits including faster healing, shorter surgical times, and increased patient comfort. The evolving nature of small-gauge technology (23-, 25-, or 27-gauge instrumentation) has meant that current systems have limitations on the ranges of instrumentation, access, case selection, and cost.

A 20-gauge sutureless technique should obviate these limitations, and it should also address problems that occur as a result of the introduction of instruments into the vitreous cavity, conjunctival ballooning, and wound sealing during and after surgery.

CASE SERIES

In my experience, the 20-gauge, tangential, circumferential, funnel-shaped scleral tunnel achieves these aims with good results. Along with my colleagues, I reported on a series of 103 consecutive eyes (309 sclerotomies) for which suturing was required in 5 sclerotomies (1.6%) at the end of surgery with no incidence of postoperative hypotony.¹ Optical coherence tomography demonstrated good apposition of the sclerotomy lips immediately after surgery, on the first postoperative day, and 1 month after surgery (Figure 1). Postoperative images of the sclerotomies on day 1 and

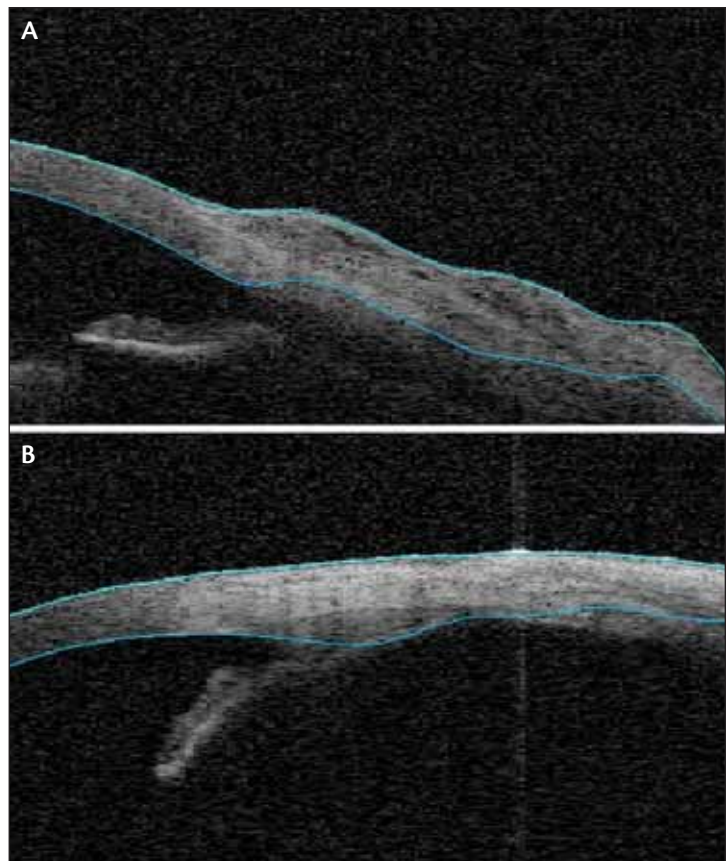


Figure 1. Optical coherence tomography demonstrated good apposition of the sclerotomy lips immediately after surgery, on the first postoperative day (A), and 1 month after surgery (B).

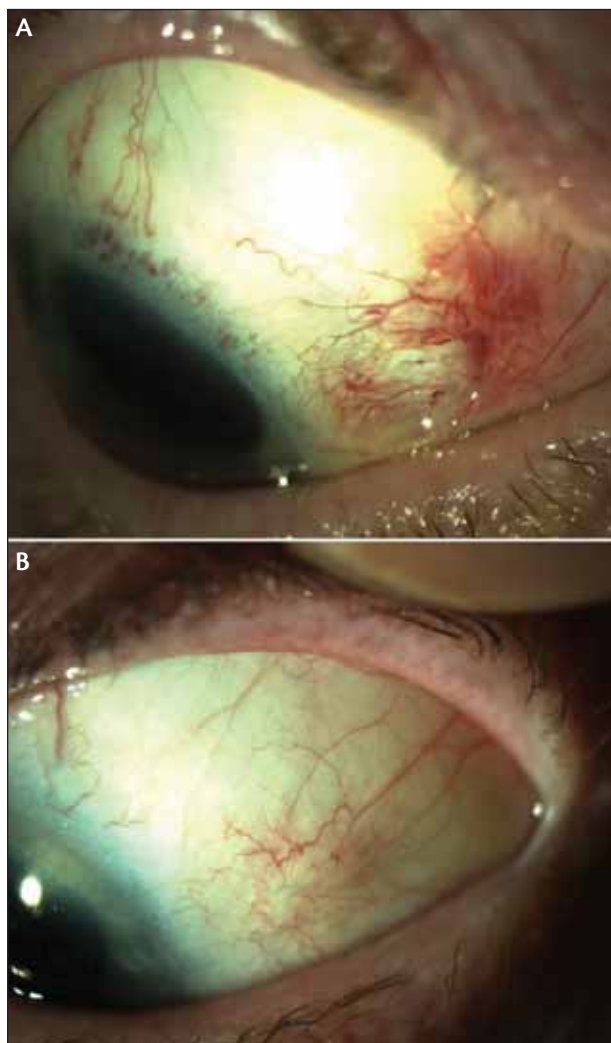


Figure 2. Postoperative images of the sclerotomy on day 1 (A) and month 1 (B) are shown.

month 1 are shown (Figure 2). I routinely use a 23-gauge trocar-cannula system as well as the described 20-gauge technique to achieve a sutureless practice.

SURGICAL TECHNIQUE

The technique is as follows: A circumcorneal, tangential, transconjunctival incision is performed at 3.5 mm from the limbus with a 20-gauge microvitrectoretinal (MVR) blade. Once the MVR blade has travelled 3 mm into the sclera, it is then rotated to enter the vitreous cavity perpendicular to the scleral surface (Figure 3). The scleroconjunctival end is widened while removing the MVR blade to create a funnel-shaped incision (Figure 4).

The aim of creating a tangential, funnel-shaped scleral tunnel is to form an intraocular pressure (IOP)-actuated

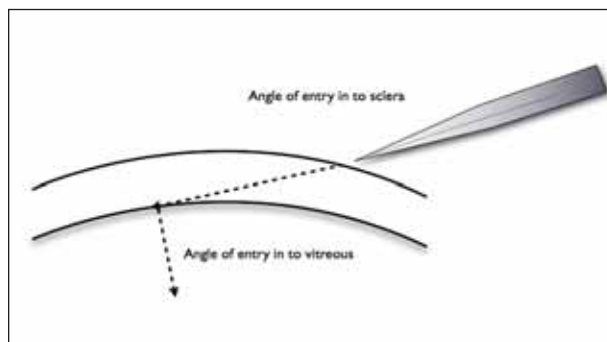


Figure 3. A circumcorneal, tangential, transconjunctival incision is performed at 3.5 mm from the limbus with a 20-gauge MVR blade. Once the MVR blade has travelled 3 mm into the sclera, it is then rotated to enter the vitreous cavity perpendicular to the scleral surface.

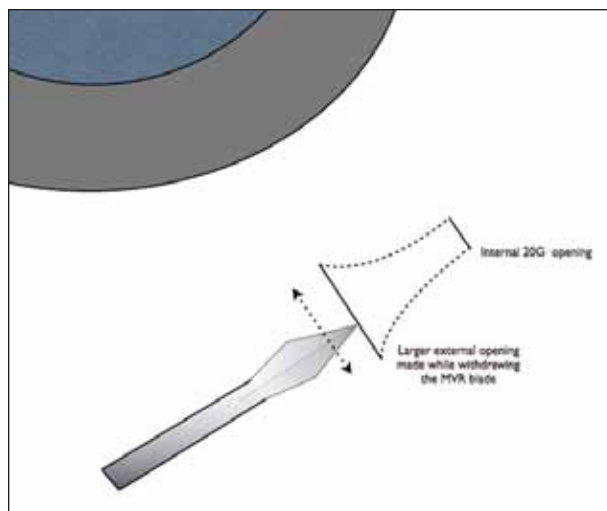


Figure 4. The scleroconjunctival end is widened while removing the MVR blade to create a funnel-shaped incision.

self-sealing valve. The funnel shape is fashioned with the MVR blade so that the internal lip of the tunnel is of 20-gauge dimensions, so that when instruments are introduced, a closed system is established. The flared outer lip allows the easy introduction of instruments, and a minimal stretching of the conjunctiva away from the wound prevents any ballooning of the conjunctiva. The sclerotomy tunnel for the infusion cannula, which is the first incision, is made without a flared opening, and a 4-mm infusion cannula is sited with the tubing taped to the cheek. The sclerotomy allows the complete spectrum of 20-gauge instrumentation, and vitrectomy is carried out in a standard manner. During instrument exchanges the valve mechanism of the sclerotomy allows the IOP to be maintained, obviating the need for plugs.

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**20-gauge Transconjunctival
Sutureless Vitrectomy**

By M.A. Awan, MD, Z.R. Koshy, MD
and Thomas Albin, MD



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Closure of the sclerotomies is achieved by applying pressure and massage with cotton tipped buds to both superior sclerotomies simultaneously to allow the IOP to rise and activate the valve mechanism. Similar pressure is applied to the infusion sclerotomy as the cannula is withdrawn. The principle of wound closure is similar to that of small-incision cataract surgery, in which the IOP activates the valve to cause wound closure. Finally, subconjunctival injections of antibiotics are given near the sclerotomies to create overhanging blebs, followed by a patch dressing, which facilitates good conjunctival cover of the sclerotomy sites.

My colleagues and I have continued to build up our case series using this technique with consistent results.

IMPORTANT CONSIDERATIONS

In attempting this technique, care must be taken that while enlarging the outer lip of the tunnel, the internal lip dimensions remain that of a stab incision from the MVR blade, as this is critical to maintain a closed system. The lack of a closed system can lead to difficulties while fluting out air or fluids. A shallow tangential entry allows a longer track leading to better valve function. Care must also be taken while indenting around the infusion cannula, so as not to displace it from its intraocular siting. If, at the end of the procedure, a sclerotomy does not seal securely, then a single bite of an absorbable suture across the sclerotomy lips should be placed. When silicone oil is employed, even with good sclerotomy closure, I prefer to place a suture as described.

TWENTY- VS 23-GAUGE TECHNOLOGY

In comparing the sutureless 20-gauge technique described with the 23-gauge trocar and cannula system, I have noted the following points. The fluidics of the larger bore 20-gauge system allows faster vitreous removal and a more effective establishment of a poste-

rior vitreous detachment. The flexibility of the instruments in the 23-gauge system leads to some difficulty in eyes with deep-set sockets or prominent brows. For the same reason, vitreous base shaving, when required, is easier with the 20-gauge cutter. The wider range of instrumentation available in 20-gauge makes it more versatile for a wide range of pathology. The proximity of the port to the tip of the 23-gauge cutter makes it an effective tool in its own right for membrane dissection. The aesthetic appearance on the first postoperative day is better with the 23-gauge system. The elliptical cross-section of the 20 gauge sclerotomies also allows a greater surface area for the valve as compared with the trocar and cannula systems; therefore, although there have been a few instances of postoperative hypotony with 23-gauge surgery, the only instance of hypotony (IOP <8 mm Hg) with 20-gauge surgery in our series was with a previously hypotonous, uveitic eye. The lack of a proper seal of the sclerotomies and associated hypotony increase the risk for serious complications such as vitreous incarceration, endophthalmitis, and suprachoroidal hemorrhage.

SUMMARY

Although technological advances will no doubt make the smaller gauge sutureless systems more versatile and accessible, our experience with this technique of sutureless 20-gauge vitrectomy makes it a viable option to achieve the benefits of sutureless surgery without the limitations of small-gauge systems. ■

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1. Awan MA, Lyall DA, Koshy ZR. A novel technique of tangential, circumferential, scleral tunnel in 20-gauge transconjunctival sutureless vitrectomy: optical coherence tomography-aided analysis of wound integrity and clinical outcome. *Br J Ophthalmol*. 2011 Jun 7. [Epub ahead of print]

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