A big disadvantage of trabeculectomy/tunnel trabeculectomies is their need for a conjunctival peritomy and subconjunctival dissection. The latter heals with scarring and subconjunctival fibrosis, which increase the risk of a failed filter. Creating a flap takes time and requires careful dissection, and the possible complications are many. They include tearing, laceration, buttonholing, and variability in thickness as well as suture-related problems. All of these procedures require clearing the site of conjunctiva and Tenon capsule for good exposure. This process provokes scarring where it should be avoided at all costs: the flap/tunnel. Procedures in which a conjunctival flap is raised are associated with a greater risk of scar-induced failure. Moreover, the creation of the flap/tunnel involves multiple steps, the scleral flap/tunnel is triplanar, and the peripheral iridotomy (PI) increases postoperative inflammation. I developed stab incision glaucoma surgery (SIGS) in an effort to avoid many of the aforementioned disadvantages while simultaneously making filtration surgery easier, faster, less traumatic, and more likely to succeed. I use a 2.8-mm bevel-up keratome to fashion a scleral-corneal tunnel in a single step and then intentionally compromise the tunnel by punching the posterior corneal lip.

THE TECHNIQUE

First, I instill an ophthalmic viscosurgical device (OVD) with a 26-gauge needle introduced at the limbus. Then, I select a site with mobile conjunctiva and slide the tissue forward with a blunt instrument. I use a keratome to make a stab incision through the conjunctiva, directly into lamellar sclera, starting about 2.5 mm behind the limbus and avoiding major blood vessels. While holding the globe firmly at the limbus, I then dissect a superficial lamellar scleral tunnel via careful side-to-side movements up to the limbus. At the ideal plane of dissection, the blade is just visible through the overlying sclera and conjunctiva. I dissect into 1 mm of lamellar cornea and then enter the anterior chamber (AC) horizontally. Downward pressure on the posterior corneal lip should be avoided during entrance into the AC to prevent “trapdoor hinging.” I then gently withdraw the blade in a single smooth movement without allowing aqueous to leak through the incision. The entire tunnel is thus created in a single step with a single instrument.

I inject an OVD into the AC through the paracentesis/SIGS tunnel. With the globe rotated downward, a Kelly’s Descemet membrane punch (1 mm) is slid along the tunnel into the AC, and the posterior lip of the corneal section is engaged and punched. Additional punches are taken posteriorly in clear cornea up to the limbus in order to compromise the tunnel. The instrument should face downward during punching, and the iris should be pushed away with an OVD. I then gently irrigate the AC through the tunnel to wash away excess viscoelastic and check the SIGS tunnel for leakage by means of sideport irrigation. The endpoint is the free flow of fluid on irrigation. I perform additional punches towards the limbus if leakage is inadequate.

A PI need not be done in eyes with open-angle glaucoma. In cases of angle closure, peripheral anterior synechiae, a shallow AC, or a tendency toward intraoperative iris prolapse into the SIGS tunnel seen upon irrigation with balanced salt solution, however, I perform a basal PI by grasping the iris with a nontoothed forceps and excising it with a curved Vannas scissors. I then close the single, small, 2.8-mm conjunctival cut with a running or figure-eight suture. Balanced salt solution injected through the sideport causes physiological hydrostatic

BY SOOSAN JACOB, MS, FRCS, DNB
ballooning of the bleb (Figures 1-2). Slight bleeding may occur during the keratome’s pass for SIGS tunnel construction, but it does not interfere with surgery and is washed away with irrigation and bleb formation.

**COMBINATIONS**

Surgeons can combine SIGS with mitomycin C (MMC) by dissecting the tunnel into lamellar cornea, applying intratunnel MMC, rinsing well, and then entering the AC. Subconjunctival MMC is not required, because there is no subconjunctival dissection.

SIGS can also be easily combined with phacoemulsification. I make the SIGS stab incision before performing phacoemulsification and implanting the IOL. Because it is self-sealing before being intentionally compromised, the SIGS tunnel does not interfere with phacoemulsification in any way. The posterior corneal lip of the tunnel is punched only after the IOL has been implanted but before the OVD’s removal. The SIGS tunnel should not intersect phaco incisions.

**BENEFITS**

The advantages of SIGS include complete elimination of subconjunctival dissection, thereby decreasing the risk of a failed filter from scarring. Because I slide the conjunctiva forward before entering the sclera, the single conjunctival incision is only 2.8 mm and is located well away from the scleral tunnel. SIGS spares much virgin conjunctiva to allow for possible future surgeries, which is crucial for any glaucoma patient.

The scleral tunnel is biplanar and less likely to seal than a triplanar incision. Because the ostium is not taken into (Continued on page 54)
the sclera, a controlled leak is possible. This together with separated scleral and conjunctival entries lessens the risk of a postoperatively shallow AC. SIGS produces posteriorly directed flow, which decreases the chance of an overhanging bleb, bleb dysesthesia, and so on.

I do not routinely perform a PI except as indicated earlier, because the ostium is well away from the iris root. Postoperative inflammation is therefore decreased secondary to less handling of the iris. Hydrostatic bleb elevation facilitates physiological expansion of the subconjunctival drainage channels. A lack of scleral sutures avoids suture-related complications as well as induced astigmatism.

In the extreme event of an expulsive hemorrhage, it is easier to rapidly close the SIGS tunnel compared with a trabeculectomy flap. In case of any difficulty such as premature entry into the angle of the AC (keeping the scleral portion of the tunnel shallow avoids this problem) or trapdoor hinging of the posterior corneal lip (prevented by avoiding posterior pressure on the internal lip), it is easy to convert to conventional trabeculectomy by slightly enlarging the conjunctival incision, sweeping conjunctiva off the tunnel, and making relaxing cuts on either side of the tunnel.

**MY EXPERIENCE**

I have been performing SIGS and SIGS with phacoemulsification for more than a year now and have completed over 40 cases. The 1-year results have been extremely encouraging; IOP is well controlled, and few patients have required glaucoma medication during the postoperative period. I have encountered no postoperatively shallow ACs, and the posteriorly directed flow has produced a diffuse bleb. In all cases, anterior segment optical coherence tomography has shown a patent ostium, and its location well away from the iris base minimizes the chance of plugging.

SIGS is easy to combine with MMC and with phacoemulsification. I have also successfully performed the procedure in more complex settings such as postpenetrating keratoplasty glaucoma.

I am gratified to see others at my institution performing SIGS and being pleased with their results. I no longer have sleepless nights worrying about the IOP or the AC after glaucoma surgery. Nor am I anxious about using releasable sutures, suture lysis, or other such micromanagement during the postoperative period. ■

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