FIVE MIGS TIPS

Pearls for the beginning angle surgeon.

BY DAVINDER S. GROVER, MD, MPH

Glaucoma treatment decision-making looked dramatically different when traditional filtering surgery was the only surgical option available. Intervention was less appealing because surgery was slightly riskier and more invasive. As treatment options have expanded to include safer and less invasive procedures, the way glaucoma specialists think about intervention has changed.

During my glaucoma fellowship 15 years ago, surgical training focused primarily on trabeculectomy and glaucoma drainage device implantation. In my first 2 years of practice at Glaucoma Associates of Texas, however, my colleagues and I completed the first ab interno bleb revision, ab interno removal of the Ex-Press glaucoma filtration device (Alcon), and gonioscopy-assisted transluminal trabeculotomy (GATT). The Kahook Dual Blade (New World Medical) and first-generation iStent (Glaukos) were also introduced around this time.

Today, many safe and minimally invasive options can be explored for the treatment of glaucoma, including selective laser trabeculoplasty (SLT), sustained-release drug delivery, cyclophotocoagulation, minimally invasive bleb surgery, and MIGS. Developments such as these have allowed ophthalmologists to rethink management approaches and confidently intervene at earlier disease stages.

This article describes the importance of early intervention and understanding angle anatomy and offers practical tips for the beginning angle surgeon.

01 Recognize the Importance of Early Intervention

Why pursue intervention when pharmaceutical options are available? Consider a patient on maximally tolerated medical therapy whose IOP is controlled but who experiences side effects from drops, has difficulty adhering to their prescribed regimen, cannot afford their medication, and/or faces other barriers to access. Drops are important, but they are not without risk.

The Laser in Glaucoma and Ocular Hypertension (LIGHT) trial showed that SLT is a safe treatment for open-angle glaucoma and ocular hypertension that provides better long-term disease control than initial drop therapy.[1,2] At 6 years, 69.8% of patients treated with SLT remained at or below their target IOP without medication or surgery. Patients in the medication arm experienced greater disease progression and had higher rates of trabeculectomy and cataract surgery.

Further, a longer duration of antiglaucoma medication may be associated with surgical failure. In a Japanese study,[3] patients underwent ab interno trabeculotomy performed with a Tanito microhook (Moria). Those receiving therapy with antiglaucoma medication for more than 4.5 years had inferior surgical outcomes compared with those administering medication for less than 4.5 years.

Early intervention should be considered because it is sometimes safer than drops and may improve outcomes with angle surgery.

02 Appreciate Angle Anatomy

It is important for developing glaucoma surgeons to appreciate the angle anatomy and consider the evolution of angle surgery.

Otto Barkan, MD, first described goniotomy in 1936,[4] and he suggested that the procedure could produce excellent results in glaucomatous eyes when combined with early disease diagnosis.[5] Other pioneers of angle surgery emerged in the 1960s. They included Hermann M. Burian, MD, and Lee Allen in Iowa; Redmond Smith, MBBS, FRCS, in the United Kingdom; and Heinrich Harms, PhD, in Germany—all innovators in ab externo trabeculotomy.

In 2011, Ronald L. Fellman, MD, and I performed the first GATT on a 20-year-old man with bilateral uncontrolled juvenile open-angle glaucoma who needed circumferential trabeculotomy. We presented our novel idea for a less invasive surgery, and he accepted. Thirteen years postoperatively, his IOP was in the low teens on no medication. The patient passed away last year. Without his courage, GATT might not exist. Credit is often given to surgeons and inventors, but it is important to recognize the role that patients play in innovation.

The work of Murray A. Johnstone, MD, demonstrated the pulsatile outflow of the eye and the intricate nature of the aqueous outflow system.[6,7] In our practice, we began to explore whether we could develop a surgery that mimicked the angle changes produced by

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GATT but spared more tissue than GATT or traditional goniotomy. We created an instrument called the iVEnT (interventional valve enhancing trabeculotomy) spatula, which is used to make a vent in the anterior nonfiltering trabecular meshwork to lower IOP. With respect to Dr. Johnstone's work, iVEnT has resulted in minimal damage to the intracanalicular valve system, potentially enhancing pulsatile outflow.

An initial retrospective analysis of more than 14 months of follow-up data showed that more than half of the patients treated with iVEnT had an IOP in the low teens on no medication (unpublished data, 2025). Because of the minimally invasive nature of this surgery, hyphema has been rare and visual recovery quick.

03 Practice Intraoperative Skills

Beginning angle surgeons must become familiar with the angle anatomy by practicing gonioscopy in both the clinic and the OR.

For those just beginning to implement MIGS, I recommend starting with iStent implantation, hemi-GATT, or the Tanito microhook. Proper visualization of the angle should always be maintained; an en face, or head-on, view is preferable to a view from above.

Additional pearls for visualization include the following:

- Be gentle, and avoid blood vessels when making corneal incisions;
- Place a small amount of an OVD on the gonioprism;
- Use an OVD to clear any blood if visualization is poor;
- First explore the use of intraoperative gonioscopy in a pseudophakic eye;
- Always maintain the anterior chamber with an OVD; and
- Do not rush, and maintain subtle movements.

04 Pay Attention to Intraoperative Positioning

Operate with the patient in a reverse Trendelenburg position, which minimizes episcleral venous pressure and reduces the risk of blood reflux. Surgeon comfort is also important. Sit up straight, with relaxed shoulders, and take a deep breath. Surgery is not a race—an extra few minutes taken to prioritize ergonomics can help prevent future pain.

05 Know the Limitations of MIGS

It is important to know which patients are not candidates for MIGS. The following factors may warrant exclusion:

- Advanced disease without an intact collector system;
- A target IOP of 12 mm Hg on no medication;
- An inability to cease blood thinner use for 1 to 2 weeks, limit activity for 1 to 2 weeks, or sleep with head-of-bed elevation;
- An unstable IOL; and
- Broad areas of peripheral anterior synechiae.

It is also important to understand the limitations of MIGS. These procedures usually do not achieve an IOP in the low teens on zero or one medication, although we occasionally see these results with the iVEnT. Procedures can fail and can be costly, and the patient may later require additional surgery. MIGS is a rapidly changing space, and there can be a significant learning curve for procedures. Moreover, long-term and comparative data on MIGS are limited.

CONCLUSION

When glaucoma fellowship ends, the learning has just begun. When adopting a new surgical glaucoma procedure, practice first in the wet lab, watch surgical videos, discuss the steps with peers, ask a colleague to come into the OR, and be prepared. Interventions continue to develop over time, so it is crucial to become comfortable being uncomfortable and to never stop learning in the OR. ■

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