

# THE BEST MIGS PROCEDURE FOR YOUR GLAUCOMA PATIENT

With a wide array of options to choose from, it is important to consider a patient's needs and expectations when selecting a MIGS procedure.

**BY MARK J. GALLARDO, MD**



Microinvasive glaucoma surgeries (MIGS) are less invasive, are more convenient, and have a better safety profile than traditional filtering glaucoma surgery. Current options give surgeons a growing number of ways to lower IOP and/or to reduce medication burden. Understanding the strengths of each approach and matching these to the needs of the patient are vital to attaining the best outcomes for patients.

**MODES OF ACTION**

The techniques and devices that fall under the MIGS umbrella take several approaches to reducing IOP (Table). The most common strategies reduce aqueous resistance in the trabecular meshwork via an implant such as the iStent Trabecular Micro-Bypass Stent (Glaukos) or through focal trabecular ablation in the nasal portion of the drainage angle via electrocautery of part of the trabecular meshwork, as done with the Trabectome (NeoMedix), or excision of a strip of the trabecular meshwork overlying Schlemm canal with the Kahook Dual Blade (New World Medical). Additionally, the entire proximal outflow system can be incised either with the Trab360 device (SightScience) or by performing gonioscopy-assisted transluminal trabeculotomy, which shears through the trabecular meshwork and the inner wall of Schlemm canal 360°.

These ablative techniques, although valuable, delete a very important blood-aqueous barrier and can allow blood from the episcleral venous system to enter the clear aqueous in the anterior chamber, temporarily clouding vision. I have

seen cases of recurrent hyphema development following trabecular ablative procedures from conditions that raise the episcleral venous pressure, which can include something as simple as sleeping on the side of the operative eye.

The more recently developed ab interno canaloplasty (ABiC) technique comprehensively and circumferentially treats the entire outflow system using viscoelastic material and the iTrack illuminated microcatheter (Ellex), thus reducing aqueous resistance within the trabecular meshwork without damaging existing tissue or implanting a foreign body. It has also been shown to create microperforations in the inner wall of Schlemm canal, which counters the reduction of micropores within and in between the endothelial cells lining the inner wall of the canal; this is seen in glaucoma patients and reduces aqueous outflow. Furthermore, passage of the iTrack lyses herniations, which obstruct collector channels and, upon infusion of the viscoelastic into the canal, dilates the collapsed canal and widens collector channels and distal system. The complete 360° viscodilation of the aqueous tract provides the surgeon with confidence that the entire system is being treated as opposed to hoping that the distal system in the nasal quadrant is patent and functioning. Because ABiC is a nonablative procedure, there is no risk of recurrent hyphema development.

Working outside of the conventional outflow system, the CyPass Microstent (Alcon) targets the supraciliary space and lowers IOP by redirecting aqueous flow to the suprachoroidal space. The Xen45 (Allergan) bypasses both of the natural systems of aqueous filtration and instead provides a conduit for fluid to drain from the anterior chamber to the

subconjunctival space, creating a filtering bleb, which requires similar evaluation and management as other filtration blebs created via trabeculectomy.

**GENERAL CONSIDERATIONS**

With every MIGS approach, the aim is to balance the effectiveness of the procedure with its potential impact on the patient's quality of

**TABLE. MIGS METHOD OF ACTION**

	Natural Outflow Pathway			Subconjunctival Space	Supraciliary Space
	Collector Channels	Trabecular Meshwork	Schlemm Canal		
ABiC iTrack	Yes	Yes	Yes		
iStent			Yes		
CyPass Microstent					Yes
Xen45				Yes	

life, and this is determined by the complexity of the procedure, longevity of results, and associated risks. Among eligible patients, I consider activities of life, disease state and severity, medication use, and comorbidities.

**Activities of daily life.** Younger, active individuals would benefit from MIGS procedures that use the conventional outflow system, because, in my experience, the conventional outflow system poses the least amount of risk for hypotony in the postoperative period. In patients with mild to moderate glaucoma and in those with healthy-appearing drainage angles, I typically opt to perform procedures that are nondestructive to allow my patients to maintain their high level of activity. Performing a procedure like ABiC still affords patients the ability to maintain all functions of life without the fear of causing harm. By lowering IOP without removal of that very important blood-aqueous barrier, ABiC has one of the lowest-risk profiles of all MIGS procedures.<sup>1</sup> It has the added benefit of not hindering a patient's suitability for additional ocular surgery in the future, if needed.

**Disease severity.** As a rule, MIGS tend to provide pressures in the mid- to low teens and may not benefit patients requiring single-digit IOPs. I still attempt to do MIGS if a patient is undergoing cataract surgery regardless of stage of glaucoma if the target pressure is in the low teens, because I have been able to achieve pressures in this target range regularly with several different MIGS procedures. At times, I may combine MIGS procedures to obtain a higher degree of IOP reduction.<sup>2</sup> I try to avoid filters as much as possible, given their complication profile, but some patients need them. If I have a patient with severe glaucoma who requires IOP in the single digits, I will opt for a filter such as the Xen45.

**Medication.** If a patient is on multiple medications, intolerant of any of the eye drops, or struggling with compliance, reducing the need for just one of those drugs will improve quality of life. Procedures such as ABiC and traditional canaloplasty have been found to significantly reduce medication burden.<sup>1</sup> A preliminary 1-year study I performed showed that mild to moderate primary open-angle glaucoma patients who underwent ABiC surgery in one eye and traditional canaloplasty in the other achieved a reduction in medication use from a mean of 2.3 before surgery to 0.9 1 year after ABiC or canaloplasty.<sup>1</sup>

**Comorbidities.** Glaucoma patients presenting with visually significant cataracts are usually ideal MIGS candidates. Combining MIGS with cataract surgery offers a convenient way to improve glaucoma management without additional risk or recovery time. My personal experience of combining phacoemulsification cataract surgery with MIGS has shown excellent IOP-lowering and medication-reduction outcomes with both ABiC and the iStent. In

general, if faced with a glaucoma patient scheduled for cataract surgery, I use ABiC to flush out his or her natural drainage system. For patients with a more diseased trabecular meshwork (those with secondary glaucomas like pigmentary glaucoma or pseudoexfoliative glaucoma), I opt for the iStent as it produces better results, in my experience, in these cases.

## PHAKIC PATIENTS

The iStent and ABiC are also effective standalone options in phakic patients. (The iStent and CyPass are currently only approved for use with cataract surgery in the United States, but I have been using them as a standalone option.) Trabecular ablative procedures can also be performed as standalone procedures. Their key advantage is greater efficacy in cases of secondary glaucoma that feature significant meshwork disease, such as in pseudoexfoliation or pigmentary glaucoma.

ABiC's advantage over these ablative procedures is its completely natural approach. By lowering IOP without alteration of the trabecular meshwork, ABiC appears to have a much safer profile than most other MIGS procedures.<sup>1</sup> It has the added benefit of not hindering a patient's suitability for additional ocular surgery in the future, if needed, including iStent implantation, trabecular ablative procedures, supraciliary/suprachoroidal shunt implantation, and even traditional conjunctiva-based filtration procedures.

## THE FUTURE

As an avid user of MIGS, I am confident that it is poised to become the standard of care for mild to moderate open-angle glaucoma. I use MIGS as a means to reduce or remove the medication burden of *all* patients undergoing cataract extraction who are on medications. By removing medications, we are removing caustic chemicals that may cause surface disease and, more importantly, removing agents that may damage and kill the cells that line the trabecular lamellae.<sup>3</sup> With a wide array of options to choose from, it is important to consider a patient's needs and expectations when selecting a MIGS procedure. ■

1. Ellex iScience, Inc. Data on File.

2. Ferguson TJ, Swan R, Sudhagoni R, Berdahl JP. Microbypass stent implantation with cataract extraction and endocyclophotocoagulation versus microbypass stent with cataract extraction for glaucoma. *J Cataract Refract Surg.* 2017;43(3):377-382.

3. Ammar DA, Kahook MY. Effects of benzalkonium chloride- or polyquad-preserved fixed combination glaucoma medications on human trabecular meshwork cells. *Mol Vis.* 2011;17:1806-1813.

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