

What Does MIGS Mean to Me?

Several surgeons share their definitions.

**BY JOHN P. BERDAHL, MD; MALIK Y. KAHOOK, MD; LEONARD K. SEIBOLD, MD;
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For this article, Glaucoma Today asked several thoughtful physicians to share their perspectives on the highly debated topic of MIGS. As you might expect, opinions differ on this emerging area of glaucoma treatment. In an effort to reduce confusion among our readership and maintain consistent terminology in GT, the publication will define MIGS as micro-invasive glaucoma surgery.

—Steven D. Vold, MD, chief medical editor

JOHN P. BERDAHL, MD

MIGS is an emerging category that shares the following characteristics articulated by Saheb and Ahmed: an ab interno microincision, minimal trauma, efficacy, high safety profile, and rapid recovery.¹ Currently, two procedures meet this definition of MIGS and may be performed in the United States: Trabectome (NeoMedix Corporation) and the iStent Trabecular Micro-Bypass Stent (Glaukos Corporation).

I believe MIGS will dramatically alter the landscape of glaucoma surgery, largely because of its favorable safety profile, which is similar to that of cataract surgery.² The other current options for glaucoma surgery have a high morbidity rate that prevents most ophthalmologists from using surgical options as an early intervention.³ By safely treating glaucoma earlier in the disease course, we ophthalmologists can slow its progression and, one hopes, obviate the need for less safe glaucoma surgery in the future. A major advantage of MIGS, however, is that it preserves future surgical glaucoma options, because the ab interno approach leaves precious conjunctiva unharmed. Some MIGS procedures, like the iStent, will allow us to place additional stents later if the target IOP is not achieved.

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safety profile of cataract surgery. Most new devices and procedures will aim to exploit Schlemm canal, the supra-choroidal space, or the subconjunctival space from an ab interno approach, while avoiding the variable healing response of the conjunctiva and allowing more invasive options in the future.

Depending on surgeons' experiences, the safety profile, and the accumulation of more data on efficacy, MIGS has the potential to be offered as an alternative to medication for first-line therapy. Initial treatment with MIGS could be especially helpful to patients who are intolerant of medical therapy or who have trouble with adherence. Some MIGS procedures may be elegant enough to be performed in the office or minor room, which could avoid costly trips to the OR.

We are on the brink of a real change in the surgical treatment of glaucoma. Cornea specialists recently trans-

formed corneal transplantation with Descemet stripping and Descemet membrane endothelial keratoplasty. Retina specialists can now successfully treat wet age-related macular degeneration with the injection of an antivascular endothelial growth factor. Cataract surgeons are adopting femtosecond lasers and intraoperative aberrometry to achieve unprecedented outcomes. Now, we glaucoma surgeons will finally be able to offer a safe, effective surgery early in the disease course to slow the progression of glaucoma.

MALIK Y. KAHOOK, MD, AND LEONARD K. SEIBOLD, MD

The FDA's recent approval of the iStent ushered in a new era in the surgical management of mild to moderate glaucoma in conjunction with cataract extraction. The term *minimally invasive glaucoma surgery* was coined by Ike Ahmed, MD, and has been used as an umbrella moniker for procedures thought to be similar to the iStent. Later, Dr. Ahmed redefined MIGS as microinvasive glaucoma surgery in an effort more clearly to separate the new procedures from others on the market. Other individuals have been using the term *microincisional glaucoma surgery*. The acronym and various descriptors have led to discussions of how to define this novel approach to the surgical management of glaucoma.

One way to define MIGS is by describing what it is not. In our opinion, MIGS should not involve significant manipulation of the conjunctiva or be associated with bleb formation. The terms *minimally invasive* or *microincisional* should exclude the use of large sclerally fixated devices such as the Baerveldt glaucoma implant (Abbott Medical Optics Inc.). Although not incisional, procedures that ablate large areas of intraocular tissue with significant collateral damage, such as transscleral cyclophotocoagulation, also do not fit our definition of MIGS.

The MIGS procedures, both present and future, may be described as a focused modulation of aqueous inflow and/or outflow in a manner requiring minimal manipulation of and trauma to tissue. The outcome is a clinically significant and sustained reduction of IOP without a negative impact on the future success of full-thickness aqueous filtration procedures if needed. MIGS may be seamlessly combined with cataract extraction or performed as a standalone procedure, and it should pose a minimal risk of permanent vision loss, infection, or significant adverse outcomes.

We define MIGS as any surgical manipulation or device implanted through a self-sealing incision with minimal trauma to tissue that results in a measurable, sustained decrease in IOP without the formation of a bleb.

NATHAN M. RADCLIFFE, MD

Patients' expectations have risen for all fields of medicine. In an era when hospitals solicit patients through radio and television advertisements that allude not just to curative cancer treatments but also to symptom-free cures, it is not surprising that patients may expect symptom-free glaucoma treatment. Are standard glaucoma surgeries able to provide the outcomes they expect? Thirty-four to 36% of patients in the Tube Versus Trabeculectomy (TVT) Study suffered serious (although often reversible) complications, and 18% to 22% required an additional surgical procedure. Traditional glaucoma surgeries, therefore, probably are not meeting the expectations of glaucoma patients or their surgeons.^{3,4}

For patients who are highly likely to suffer serious vision loss from glaucoma, the risks of a tube's implantation or a trabeculectomy may be acceptable, because patients in the TVT Study achieved roughly a 50% reduction in IOP.³ What about patients who do not possess such a high likelihood of blindness but are still at risk? MIGS represents an effort to better balance the drawbacks and rewards of glaucoma surgery for the large number of patients with mild or moderate glaucoma whose level of risk requires a more favorable safety profile. In my mind, therefore, MIGS is defined not by the size of the incision but by its safety profile, and any safe surgery that meets patients' and surgeons' goals for efficacy is welcome into the MIGS family.

HADY SAHEB, MDCM, FRCSC

During the past few years, the interest in and availability of MIGS has risen around the world. The term MIGS was coined by Dr. Ahmed, but its meaning has varied over time. The importance of defining MIGS lies in the ability of a definition to frame a list of procedures with recognizable qualities. This framework facilitates the development of the role of MIGS within the glaucoma treatment algorithm, the design of comparative research studies, and regulatory and commercial affairs. MIGS refers to a group of surgical procedures that share a few preferable qualities.¹

The first of these qualities is an ab interno microincisional approach. Clear corneal incisions spare the conjunctiva, allow the surgeon direct visualization of and access to the angle structures, and can be easily used for combined surgery. Microincisions also permit intraoperative maintenance of the anterior chamber, optimize refractive outcomes, and minimize wound leaks and the risk of infection. Sparing the conjunctiva from incisions and scarring is a key feature that allows later conjunctival surgery to be performed if needed.

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—Hady Saheb, MDCM, FRCS

A second quality of a MIGS procedure is that it is minimally traumatic to the target tissue. An atraumatic approach lessens inflammation, accelerates postoperative recovery, and maintains anatomy and the physiologic outflow pathways. This approach allows the resistance in the physiologic outflow pathways to prevent hypotony-related complications that are more common with surgeries that bypass the physiologic pathways.

A third feature is efficacy, which should at least be modest. Efficacy and safety will ultimately determine the role of MIGS procedures within the glaucoma treatment algorithm. Proof and the quantification of efficacy require randomized clinical trials. Comparative treatment arms to MIGS procedures have ranged from medication to phacoemulsification to invasive glaucoma surgery. The most appropriate selection for the comparative study arm in MIGS research should be the type of intervention closest to its expected role within the glaucoma treatment algorithm. This choice of intervention should also parallel the expected efficacy and safety profile of these surgeries.

A fourth quality is a rapid recovery with minimal impact on the patient's quality of life. The fifth (and a very important) feature is an extremely high safety profile. MIGS must avoid serious complications such as hypotony, suprachoroidal hemorrhage, choroidal effusions, corneal decompensation, diplopia, and bleb-related complications, including dysesthesia and endophthalmitis. This high safety profile allows MIGS to play an earlier role in the glaucoma treatment algorithm than more invasive surgeries. Rapidity and ease of use are also important characteristics of MIGS, because they will allow the integration of these procedures into a wide spectrum of clinical practices, ranging from academic centers to private practices, comprehensive ophthalmology, and developing countries.

The future of MIGS is exciting. Ultimately, proof and quantification of effect with randomized clinical trials will guide its exact role within the treatment algorithm. Surgeons must also be conscious of the biocompatibility of MIGS devices in the long term. Given the initial reports, I expect MIGS to assume an important role between medications and laser therapy and more invasive glaucoma

surgeries. Just as the improved safety profile of phacoemulsification has allowed patients with cataracts to benefit from surgery at an earlier stage, MIGS may offer similar benefits to patients with glaucoma. This advantage may be even more important in glaucoma patients, because treating them earlier in the disease spectrum may prevent the complications more commonly seen during operations on patients with advanced disease. MIGS certainly has a role within the glaucoma treatment algorithm that will undoubtedly increase and continue to be clarified. ■

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