MD Roundtable, Part 2: Selecting the Right MIGS

Microinvasive glaucoma surgeries (MIGS) enable ophthalmic surgeons to perform precise, individualized glaucoma management, but selecting the most appropriate procedure can be difficult. In this second installment of a two-part MD Roundtable discussion, Ahmad Aref, MD, MBA, of the University of Illinois in Chicago, continues the dialogue with Constance O. Okeke, MD, MSCE, of Virginia Eye Consultants in Norfolk, and Albert S. Khouri, MD, of Rutgers New Jersey Medical School in Newark. The experts share thoughts on choosing MIGS modalities in various hypothetical cases.

Controlled Glaucoma With Cataract

Dr. Aref: *Imagine a patient with visually significant cataract and mild to moderate open-angle glaucoma that is controlled to the target intraocular pressure (IOP) with topical medical therapy. You're considering cataract extraction with IOL implantation. Which MIGS would you choose for this?*

Dr. Khouri: The iStent or iStent inject (both Glaukos), or the Kahook Dual Blade (KDB; New World Medical), would be my go-to MIGS for this case. Of course, there are other MIGS that would work for this patient. I have more experience with the iStents and with the KDB, and I've had good results with both.

Dr. Okeke: I agree that the iStent or iStent inject could yield good outcomes for this patient. I tend to prefer the iStent inject because I've found that the results are a bit more efficacious, and the procedure has been fairly easy to learn.

Ab interno canaloplasty (ABiC) and goniotomy are also options for this hypothetical case. For goniotomy, I use either the Trabectome (NeoMedix) or the KDB. In a patient with early-stage controlled glaucoma, my aim would be to get the patient off medication, and I would try to choose a modality with minimal risk of complications. MIGS involve different levels of inflammation and risks of bleeding postoperatively. With goniotomy, there is greater risk of bleeding than with stenting or canaloplasty, in my hands. I probably would choose the iStent inject or ABiC.

I think the Omni surgical system (Sight Sciences), which includes two MIGS mechanisms, canaloplasty and goniotomy, also could work for this patient.

I'm a firm believer that ophthalmic surgeons should get experience with numerous MIGS options. There are often multiple microinvasive procedures that can yield good outcomes, and the reality is that insurance approval in the majority of cases is a deciding factor. The more MIGS modalities you can perform, the better you can tailor care for your patient.

XEN. *Goniotomy, canaloplasty, and the Xen gel stent also are options for a patient with pseudophakia, with the Xen device reserved for advanced disease, according to Dr. Okeke.*

Dr. Aref: For a patient whose glaucoma is controlled with topical agents, would you say that the safety profile is most important, even if there may be some sacrifice in efficacy?

Dr. Okeke: Yes. I wouldn't carry out a procedure if I didn't feel that the efficacy was there because all these MIGS involve risk. Rather, I can achieve similar efficacies with multiple procedures, so I would choose MIGS with the best safety profiles—the ones that will cause the least bleeding and have the lowest risk of inflammation. For me, stenting and canaloplasty tend to be the safest modalities that still are efficacious for mild topically controlled glaucoma.

Uncontrolled Glaucoma

Dr. Aref: *Let's consider the same patient, but now the IOP is slightly above target. Does that change which*

ROUNDTABLE HOSTED BY **AHMAD A. AREF, MD, MBA,** WITH **ALBERT S. KHOURI, MD,** AND **CONSTANCE O. OKEKE, MD, MSCE.**

procedure you'd consider?

Dr. Okeke: For a patient with uncontrolled glaucoma who is on one medication, I would probably choose the iStent inject. I have had better efficacy with the iStent inject than with the first-generation iStent. In one study, the iStent inject yielded an average IOP reduction of 37%, which is substantial.[1]

I also would consider canaloplasty; with this option, my patients have had IOP reductions of approximately 30% to 40%. Canaloplasty can work especially well for a virgin eye (i.e., conjunctiva without prior manipulation) with early glaucoma in which the outflow system is likely to be functional.

> If I'm combining MIGS, I try to tackle an outflow mechanism and an inflow mechanism. [This way] we often can forestall the need for more invasive glaucoma filtering surgery. —*Dr. Aref*

I'm also a big fan of goniotomy. I perform Trabectome most frequently and have good outcomes. However, if I have the option to perform stenting or canaloplasty, which have lower bleeding risk than goniotomy, then I would choose either of those modalities.

Dr. Aref: A major factor I consider when selecting among MIGS is whether the patient is on a systemic anticoagulant. I perform both stenting and goniotomy, but in such a case, I would prefer stenting to avoid the bleeding risk associated with goniotomy.

Dr. Khouri: For a patient with mild to moderate glaucoma and IOP slightly above target, I would still proceed the same way surgically as I would for a patient with controlled pressure. However, I would have a different discussion with the patient preoperatively. Patients must have realistic expectations with MIGS; it's difficult to predict how each case will respond to treatment. For instance, phacoemulsification is an IOP-lowering procedure. When we combine it with stenting or goniotomy, typically we get additional pressure reduction and a reduction in medication burden. Patients with a higher pressure could potentially reach their target IOP with this approach; however, a subset of patients with more refractory disease or uncertain status of the aqueous outflow (and currently we have no means to ascertain Schlemm's and collector channel outflow state) will need additional treatment to reduce IOP further. Each patient must be aware of this possibility.

Primary Versus Secondary

Dr. Aref: *If a patient has secondary open-angle glaucoma—associated with pseudoexfoliation or pigment dispersion—how does that play into your decision-making?*

Dr. Okeke: I tend to perform goniotomy with the Trabectome for my patients who have pseudoexfoliation glaucoma that is too advanced to benefit from selective laser trabeculoplasty (SLT) or have failed to gain adequate control after SLT. In pigment dispersion syndrome, it's a mixed bag. Theoretically, goniotomy is better than stenting to remove the pigment excess, but canaloplasty should also be considered. I've performed goniotomy in several cases of pigment dispersion syndrome, and sometimes I've been surprised that the outcomes weren't better. The pigment can migrate down the outflow channels and cause blockage.

Canaloplasty involves a multidirectional mechanism of opening the Schlemm's canal by teasing apart adhesions and flushing out pigment through the trabecular meshwork pores and on through the outflow system. When I'm already using the iTrack microcatheter (Ellex) for ABiC, or ab interno canaloplasty, I sometimes combine it with a mini–gonioscopy-assisted transluminal trabeculotomy (GATT) to gain additional efficacy with multiple MIGS mechanisms.

Dr. Khouri: Secondary glaucoma is a very broad category that can involve exfoliation or pigmentary glaucoma. I've had excellent results with stenting procedures in steroid-induced glaucoma. I've also had good results with a combination of viscodissection and the iStent or goniotomy. Conversely, I have had patients with uveitic glaucoma who received tube-shunt surgery in one eye, had postoperative complications—hypotony or exposure issues—and then refused to undergo tube-shunt surgery in the fellow eye. For these patients, there still are MIGS options, especially in combination with cataract removal and synechiolysis, which deepens and opens the angle.

It's important to keep in mind that MIGS treatment of secondary glaucoma is not well studied and is off-label. There aren't many evidence-based recommendations yet. Our procedures are based mostly on personal experience, case series, or case reports. I think surgeons should individualize the surgical plan when dealing with secondary glaucoma because we don't yet have the data to support one procedure versus the other.

Dr. Aref: In studies of the Trabectome[2] and the KDB,[3] results of subanalyses often show that the efficacy achieved with these procedures is much higher in patients with pseudoexfoliation glaucoma than in those with primary open-angle glaucoma. I agree that secondary glaucomas are a broad category, but at least for pseudoexfoliation, I think that the evidence is mounting that these goniotomy procedures are highly efficacious.

Uncontrolled Glaucoma Without Cataract

Dr. Aref: *Let's say we have a patient with IOP above the target level but without visually significant cataract. Which MIGS would you consider?*

Dr. Okeke: Several MIGS options could be performed as stand-alone procedures in the absence of cataract extraction. These include goniotomy techniques—the Trabectome, KDB, or GATT—as well as canaloplasty, which can be performed independently with ABiC, or a combination of these techniques, as with the Omni surgical system. The decision to perform canaloplasty versus goniotomy versus a combination would depend on patient characteristics, such as angle anatomy and desired IOP reduction.

Dr. Khouri: The MicroPulse device (Iridex) for transscleral cyclophotoco-

agulation (CPC) is also an option for a stand-alone procedure, regardless of the cataract condition. Another possibility is subconjunctival surgery with the Xen gel stent (Allergan). We generally reserve the Xen device for advanced disease and perform MicroPulse for a range of moderate or more severe glaucoma in which patients want to avoid traditional surgery and the consequent burden of postoperative care and follow-up.

Pseudophakia

Dr. Aref: *If the patient is pseudophakic, do your MIGS options expand at all?*

Dr. Khouri: For pseudophakic patients, the angle is typically more open; you're done with the appositional factor. I find that angle procedures tend to work well in pseudophakic eyes. In contrast, I prefer not to go into the eye to perform intraocular cilioablative techniques, like endoscopic cyclophotocoagulation (ECP), as a stand-alone procedure. The Xen implant is also a good option for patients requiring lower target pressures.

Dr. Okeke: If a patient is pseudophakic, I would go through the gamut of conservative management with laser therapy, using SLT. I would consider MicroPulse if I was concerned about access to the patient's angle and had low concern about post-op inflammation. Goniotomy, canaloplasty, and the Xen gel stent also are options for a patient with pseudophakia, with the Xen device reserved for advanced disease.

Dr. Khouri: MIGS can be effective as stand-alone technologies. In a recent five-year study,[4] investigators evaluated results of treatment with the two first-generation iStents as a stand-alone procedure versus a prostaglandin. The efficacies of the stand-alone stents were similar to those of prostaglandin, with approximately 35% reductions in IOP up to five years.

MIGS do have a role in pseudophakic eyes with uncontrolled IOP, especially when you want to avoid conventional surgery. With more studies like this, it will become easier to make the case for MIGS to patients and to their commercial insurers, who often push back on covering these procedures.

MIGS Combos

Dr. Aref: *Are there any combinations of MIGS that you've found to work exceptionally well?*

Dr. Okeke: I think canaloplasty combines well with goniotomy. The result is flushing the outflow system and removing a portion of the meshwork to help maintain access to those outflow channels. For instance, the Omni system is a device that comprises viscocanaloplasty and goniotomy. In addition, the iTrack combines ABiC with the potential to do a partial goniotomy procedure with a mini-GATT.

Some doctors have discussed combined procedures of, say, a stenting device plus goniotomy. Again, lack of insurance approval can be a limitation for these combined approaches. When we think about combining MIGS that address different mechanisms of action, it's analogous to combining medical therapies. We know that different medications can work synergistically or in an additive way.

We could combine multiple MIGS in the same surgical session, or we can carry out a MIGS-after-MIGS approach in separate sessions. For some cases in which I've used the Trabectome, the result was stable for three or four years and then started to lose efficacy. Because that was a partial goniotomy, I was then able to do ABiC to address the rest of the intact Schlemm's canal and achieve additional IOP reduction. Similarly, in some cases, I've performed stenting first and goniotomy later. By applying MIGS serially, you can extend the time that a patient can be treated in a minimally invasive approach while still getting efficacious pressure lowering.

Dr. Khouri: I rarely combine MIGS. But I would do so, for example, in a patient with multiple comorbidities when the number of OR sessions must be minimized. I don't have a lot of experience with ECP, but I perform MicroPulse CPC often. For patients requiring low pressure who do not want a trabeculectomy or a tube shunt—and if I felt that phacoemulsification and stenting or goniotomy might not be enough—I've added a conservative two-quadrant MicroPulse CPC in the OR. Again, this is based on personal experience, as there is not enough literature on combination MIGS.

Another setting where concomitant sequential OR procedures work would be viscodissection of synechial closure to open the angle and expose the trabecular meshwork, which then would permit angle surgery, especially in uveitic eyes. I think we'll eventually have more evidence-based knowledge about how MIGS devices work together, particularly when the mechanisms of action are complementary, such as a future supraciliary device combined with stenting or goniotomy.

Dr. Aref: My outlook on this is pretty simplistic. If I'm combining MIGS, I try to tackle an outflow mechanism and an inflow mechanism. I do use ECP quite often in my practice. With two-site ECP plus an outflow maneuver—such as with the iStent inject or KDB—in addition to cataract surgery, we often can forestall the need for more invasive glaucoma filtering surgery.

1 Hengerer FH et al. *Ophthalmol Ther.* 2018;7(2):405-415.

2 Ting JL et al. *J Cataract Refract Surg.* 2012;38(2):315-323.

3 Sieck EG et al. *Ophthalmol Glaucoma.* 2018;1(1):75-81.

4 Fechtner RD et al. *Ophthalmol Glaucoma.* 2019;2(3):156-166.

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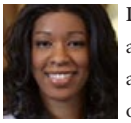

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