HOT TOPIC

MIGS—The New Wave of Glaucoma Surgeries

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Glaucoma is the leading cause of permanent vision loss in the world, affecting nearly 80 million people. In years past, optometrists and ophthalmologists were more limited in our offerings to manage glaucoma.

We would manage patients using medications and SLT/ALT up until the point that they required surgical intervention, typically either a trabeculectomy or tube shunt. Although these surgeries are very effective and still often times required today, they do carry inherent risks of complications such as hypotony, infection, failure due to scarring, etc. Over the past 10 years there has been a significant increase and improvement in Minimally Invasive Glaucoma Surgeries (MIGS). This is allowing physicians to provide safer and increasingly more effective surgical options to help control our patient's glaucoma.

With the introduction of MIGS we can now offer our patients another avenue to surgical success. MIGS are typically performed at the time of PHACO but some can be performed as a stand alone glaucoma surgery.

The following are MIGS approved for mild to moderate POAG combined with PHACO:

iStent/iStent Inject This is performed at the time of PHACO. The introduction of the original iStent was performed by inserting a single iStent into the nasal angle through the trabecular meshwork (TM). This was then modified to the iStent Inject using 2 iStents injected into TM extending into Schlemm's canal.

Studies show 75.3% of patients receiving iStent Inject with PHACO achieve at least 20% IOP reduction vs 61.9% in the PHACO alone group, and a mean IOP reduction of 6.9 mmHg in iStent inject group vs 5.4 mmHg in PHACO alone group.

Hydrus Microstent This is inserted at the time of PHACO into Schlemm's canal spanning 90 degrees. This functions to enhance aqueous outflow.

The Hydrus Trial (HORIZON) Study showed 77.2% of patients achieve >20% IOP reduction at 24 months vs 58.7% in the PHACO alone group, and the Hydrus group achieved 7.6 mmHg IOP reduction vs 5.3 mmHg in PHACO alone group.

Cypass-Involves a tiny Micro Stent extending from the angle into the supraciliary space. Although was effective at lowering IOP, there were cases of corneal endothelial cell loss so this was voluntarily pulled from the market in 2018 and is no longer being implanted.

The following are MIGS that can be done as stand alone surgery in mild, moderate, and severe stage glaucoma:

Trabectome This is performed by "unroofing" trabecular meshwork exposing Schlemm's canal using either a blade or electrocautery. This enhances aqueous outflow through Schlemm's canal into the collector channels. An analysis of data showed a 39% decrease in IOP with a trabectome alone vs 27% reduction when combined with PHACO.

Xen Gel Stent Involves implantation of a small stent through a clear corneal incision extending from the angle into the subconjunctival space. The translimbal implant targets the sunconjunctival space for ab interno bleb formation and consists of a 6-mm porcine gel material crosslinked with glutaraldehyde, 45 microns in diameter, that swells and becomes flexible when implanted. Clinical trials showed a 20% reduction in IOP and up to 40% reduction in IOP when combined w/ PHACO.

GATT- gonioscopy assisted transluminal trabeculotomy A microcatheter or suture is passed through Schlemm's canal then advanced 360 degrees. It is then pulled to lyse through the trabecular meshwork. A retrospective study showed reduction in IOP between 40-57%.

Who are candidates?

The best candidates for MIGS are those with mild to moderate glaucoma. Think of MIGS as a treatment strategy if a patient has a visually significant cataract and you feel they would benefit from further IOP reduction from present levels, or you would simply like to decrease the number of medications needed to control their glaucoma. MIGS are also an option for patients that could use lower IOP but don't warrant the risk involved with a more invasive procedure. Also keep in mind PHACO alone can lower IOP especially in those individuals with narrow angles preoperatively.

What are the advantages to MIGS over traditional glaucoma surgeries?

They are unquestionably safer surgeries. None of these surgeries require opening up the conjunctiva so there is less risk of scarring, hypotony and infection.

They often allow us to use fewer glaucoma medications post operatively and in some cases, eliminate all glaucoma medications. This allows for improved compliance, less potential for side effects from medications, and can help ease the financial burden of glaucoma medications.

What are the disadvantages to MIGS?

MIGS typically can not achieve IOP reduction to levels as low as traditional trabeculectomy and tube shunts. For example, if your glaucoma patient is progressing with low IOP's and the goal is set to <10-12 mmHg range they will likely still require a filtering surgery. That being said, should a surgeon elect to try a MIGS and it fails to adequately reduce the IOP, they can still perform traditional glaucoma surgeries.

MIDWEST COMMENTARY

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With so many MIGS options available, which have become your go to?

There are indeed a myriad of MIGS options available and choosing among them can be a challenge. I like to group them by mechanism and have at least one surgery for each. The first category and for which there are the greatest number of options are Schlemm's canal based surgeries. The iStent, iStent inject, and Hydrus are all implants that bypass trabecular meshwork and stent open Schlemm's canal. Goniotomy and Trabeculotomy unroof the canal; canaloplasty dilates the canal. All of these are good options for a modest IOP-lowering. My personal favorite is the Hydrus implant, but I also regularly perform goniotomy with the Kahook Dual Blade and implant iStents, depending on the patient's angle anatomy. The second mechanism is ciliary body modification to decrease inflow. This would include endoscopic cyclophotocoagulation and micropulse cyclophotocoagulation. Third, there is the potential for supraciliary shunting, though since the withdrawal of the Cypass there is no supraciliary shunt available for use the US. Finally, the XEN gel stent is sometimes considered MIGS, but I would characterize it as "moderately" invasive, since it involves full thickness shunting of fluid from the anterior chamber to the subconjunctival space so has more potential for serious complications. Still, the XEN gel stent is quite safe and effective so I use it frequently.

Can MIGS be combined with an advanced technology IOL?

MIGS can definitely be combined with an advanced technology IOL in the right patient. Any of the angle surgeries can be paired with ATIOLs, though with some considerations. I have seen some transient ciliary body swelling that causes a temporary myopic shift for a few weeks after surgery. There may also be early or late hyphema that can affect the rate of visual recovery. Therefore a multifocal IOL is not contraindicated when paired with an angle-based MIGS, but possible slower visual recovery should be anticipated. Endoscopic cyclophotocoagulation (ECP) is often paired with cataract surgery, but there is a potential effect on the effective lens position and a higher rate of postoperative inflammation so I personally would be hesitant to pair a multifocal lens with ECP. Toric lenses on the other hand are a great option when paired with MIGS. I would only recommend caution if a future bleb is anticipated - modern trabeculectomy and XEN techniques minimize induced astigmatism but it certainly still happens. So if someone is a low toric candidate and is having a combined phaco-XEN or a future trabeculectomy is anticipated, I may still implant the toric lens but sometimes would recommend against if I think it will someday work against attaining their best vision.

MIGS are a "hot topic" in glaucoma these days. What else is coming in the pipeline that you are excited about?

While MIGS has certainly made the last several years in glaucoma treatment exciting, they are still surgeries and are therefore further along the treatment algorithm. I am really looking forward to drug delivery systems that do not require daily eye drop administration. The adherence and quality of life issues associated with eye drops is a huge challenge in the management of glaucoma. Therefore, the more we can make medical treatment easier for the patient the better our outcomes will be. Even further into the future but I hope sooner than later, is neuroprotection. Glaucoma is a problem of susceptibility of the visual pathways to damage and can be independent of intraocular pressure. When a drug that prevents the degeneration of the optic nerve is developed, it could truly be a game changer for our patients. It could also have applications in a wide array of neurological disorders.

Any thought on long term control with MIGS? How long do they last?

I counsel all patients having any glaucoma procedure, whether it be SLT, MIGS, a trabeculectomy or a tube shunt that the pressure reduction may only be temporary and other procedures may very well be necessary in the future. The risk profile for MIGS is lower than for full thickness procedures, so one would expect that the 'reward' in terms of pressure lowering is also more modest. There is no perfect glaucoma surgery that is very low risk and very high efficacy. Therefore the MIGS offer the right balance of safety and efficacy for the right type of patient. I think the lackluster long term efficacy of the original iStent made some skeptical of MIGS in general. However the 4 year update of the Horizon trial for the Hydrus trabecular microstent shows lasting efficacy in terms of percentage of patients who are medication free and patients who avoided other glaucoma surgery. Therefore, the lasting efficacy of MIGS probably depends a great deal on the specific patient population and surgery.

MID-ATLANTIC COMMENTARY

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If my glaucoma patient is compliant with their PGA drop and has maintained good IOP control, do you still recommend a combined cataract / MIGS procedure?

The reality is that even if the patient is under good control, even with a once daily medication, they may be interested in the opportunity to have their drops reduced. In an in-house survey of 60-70 patients, we asked patients what their interest level would be to get a procedure that would help reduce or eliminate their need for drops and 86% of patient were interested or extremely interested. Maybe less than 1% of patients defer having a MIGS procedure. If they have cataracts and glaucoma, they are even more interested.

When making a referral for a MIGS procedure, should I recommend for a specific procedure or device?

I tend to suggest you discuss MIGS in general versus a specific device. When a surgeon evaluates the eye, there may be certain nuances in the eye that surgeon may suggest one procedure over another. Another reason is due to insurance, some procedures are covered while others are not. Lastly, the choice of MIGS surgery may be due to the availability of the various technologies at the ambulatory surgery center or hospital.

How has patient acceptance for MIGS been? Are patients really interested?

Overwhelmingly yes!! Patients are interested in having less dependence on drops. You have to understand just like patients are interested in more convenience with less glasses, patients want more convenience with less drops. Many patients experience side effects with drops such as irritation, blurred vision, and dry eye so the acceptance have been exceptionally high. When we discuss the procedure and the potential to reduce their medications, we discuss the postoperative healing/drops are similar to routine cataract surgery and patients appreciate that possibility.

Can MIGS procedures be comanaged?

Yes MIGS can be comanaged for majority of cases depending on the comanaging providers comfort level and clinical appropriateness. An example is the Xen gel stent which is used for refractory glaucoma where the conjunctiva may need some needling early in the postoperative period so I would want to watch those patients a little more closely as opposed to the iStent procedures which are more standardized. It's important to be educated on the various MIGS technologies and discuss/work with your surgeon to know what to look for, what to expect, and how to trouble shoot during the postoperative period.