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(866) 423-7849

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### Minimally Invasive Glaucoma Surgical Procedures: Should I Incorporate Them Into My Practice?

Narrator:

Welcome to the CME-certified activity, "Minimally Invasive Glaucoma Surgical Procedures: Should I Incorporate Them Into My Practice?" on ReachMD. This activity is co-provided by Med-IQ and Duke University Health System Department of Clinical Education and Professional Development.

In this segment, Dr. Leon Herndon of the Duke Eye Center discusses the benefits and limitations of minimally invasive glaucoma surgical—or "MIGS"—procedures.

During the past few years, interest in using less invasive glaucoma surgeries has significantly increased. MIGS procedures are becoming increasingly available and play a different role from more invasive surgeries within the glaucoma treatment algorithm. Trabeculectomy, or guarded filtration procedure, and tube shunt surgery, also known as aqueous shunt surgery, remain the most commonly performed incisional procedures for the management of glaucoma. Historically, trabeculectomy has been preferred over tube shunt implantation (except in patients with treatment-refractory glaucoma who are at high risk of filtration failure). However, concerns about bleb-related complications, such as bleb-associated infection, endophthalmitis, and ocular discomfort, have contributed to an expanded use of tube shunts as an alternative to trabeculectomy. Medicare claims data show a 43% decrease in the number of trabeculectomy procedures and a concurrent 184% increase in tube shunt surgeries between 1995 and 2004.

MIGS procedures seek to avoid bleb formation entirely and rely on augmentation of the physiologic outflow pathway by enhancing aqueous outflow through Schlemm's canal, the suprachoroidal space, or the subconjunctival space. The techniques confer similar benefits, such as minimal trauma, efficacy, and rapid recovery. In addition, they share common features, such as ab interno microincision and a favorable safety profile. MIGS procedures are still in the initial stage of clinical experience and consequently are not widely used. Currently, clinical studies are limited to nonrandomized, interventional clinical case series that are either retrospective or prospective and generally classified as providing only level 3 evidence in support of these procedures. Furthermore, no randomized trials of appropriate power comparing MIGS procedures with other novel techniques or trabeculectomy have been published. It is hoped that further clinical experience and data from additional studies can help clinicians determine how to best use these new procedures in patients with glaucoma.

To that end, Dr. Herndon provides insight on identifying candidates for MIGS procedures and discusses other available surgical options for controlling intraocular pressure following MIGS procedure failure.

Your host is Dr. Adrienne Scott, who is Assistant Professor of Ophthalmology at Wilmer Eye Institute, Johns Hopkins University School of Medicine in Baltimore, Maryland.

Dr. Scott:

It's my pleasure to be here with Dr. Leon Herndon, glaucoma specialist, and a leading researcher in the glaucoma and cataract surgery field. As we know, there's an increasing demand and need for safer glaucoma surgery, to address the increasing prevalence of glaucoma and cataracts, in an aging population. New procedures and devices aim to lower intraocular pressure and to improve patients' quality of life. These new procedures are the next wave of IOP-lowering devices, designed to improve the patient's quality of life, and have been collectively termed minimally invasive glaucoma surgery, or MIGS devices. I am your host, Dr. Adrienne Scott. We're recording live from the American Academy of Ophthalmology Meeting in Chicago. And again, I have Dr. Leon Herndon with me today,

Professor of Ophthalmology at Duke University School of Medicine. Dr. Herndon, welcome to ReachMD.

Dr. Herndon:  
Thank you, Adrienne.

Dr. Scott:  
So, let's get into the discussion of these MIGS devices. Can you explain for our audience who are the appropriate glaucoma patients for these procedures?

Dr. Herndon:  
Certainly. The MIGS procedures are really filling an unmet need in glaucoma, and what they are ideal for are patients with mild-to-moderate glaucoma where you might not want to perform traditional glaucoma surgery, such as trabeculectomy or glaucoma drainage tube, that have both been associated with several complications and potential complications. So, the whole class of MIGS is a safer option for patients who don't have the severe disease, and so, it has been a great improvement in our options for patients. We may not hit a home run when it comes to pressure lowering. You may not get pressures down to 10, but these are patients who don't need pressures that low. So, appropriate patients are those who have mild-to-moderate disease, or those who aren't able to tolerate medications, glaucoma medications. So this is really expanding our ability to provide safer procedures for our glaucoma patients.

Dr. Scott:  
That's fascinating. And can you give us an idea if these procedures can be performed in combination with cataract surgery, and what the sequence of the procedures would be?

Dr. Herndon:  
Absolutely. Most of the newer devices that come to the market have to do studies combined with cataract surgery. The FDA requires that. You have one arm with cataract surgery by itself; the second arm cataract surgery with the MIGS device. And so, it lends itself well, these procedures, to the cataract surgeon, because we're going through the same clear corneal temporal incision. Most of these procedures are targeting the trabecular meshwork so the surgeon has to be very facile with the intraoperative gonioscopy, to be able to visualize the meshwork and, thereby, able to apply these devices to that space. So, it lends itself very well with cataract surgery. Typically, when we're combining these with cataract surgery, we'll do the cataract surgery first; we'll implant the intraocular lens, and then you have a little bit more freedom, a little bit more space where you can work in that small space to approach the trabecular meshwork.

Dr. Scott:  
Interesting, so if I'm a glaucoma surgeon or an anterior segment specialist, that I'm used to performing these more traditional IOP-lowering procedures, can you describe the learning curve and how do I get into becoming facile with these MIGS devices?

Dr. Herndon:  
One thing that would be very helpful for cataract surgeons who want to do these types of procedures, or glaucoma surgeons who are doing cataract surgery, is when you're doing a routine cataract surgery case, once you place the lens in, you may want to start experimenting, or start practicing, by rotating the patient's head away from you, and also you have to rotate the microscope towards you 30 degrees, and get used to using a gonial lens, because you're using your non-dominant hand to be able to visualize the angle. So, you can also, when you make those adjustments, you can use a Sinsky instrument, or some type of instrument in your dominant hand, to sort of approach the angle under the microscope, sort of work on the gentle pronation that's needed with many of these techniques. So, I teach my trainees that just with routine cataract surgery, in a case, that's a great opportunity to start becoming facile with these types of procedures.

Dr. Scott:  
Very interesting. And about, approximately, how many cases would it take the typical surgeon to become comfortable performing these procedures?

Dr. Herndon:  
Well, there are several procedures devices that are available. Some have a steeper learning curve than others, but like anything, once you do more of them, then you'll be more comfortable. I'd like to say at least 20 cases with any of these procedures to start getting to the point that you feel comfortable doing them. But, you always will face a patient where the anatomy is different, or there's bleeding when you approach the angle, where you need to step back, and maybe not proceed with performing that procedure, and there's always another day. That's one great thing about these procedures is that they don't cause the complications to the degree of traditional glaucoma surgery. You typically are partnering them with cataract surgery, so patients are actually going to see better. And when you have the explanation with them the next day that, I could not place the iStent or I could not do the Trabectome because of the anatomy,

they're understanding, they're seeing better. You also tell them that many patients who have just cataract surgery by itself have a significant pressure lowering. And so, it's not the end of the world if you have a case where you can't place the device, or you can't perform the procedure, but it is good to continue to push forward with more cases.

Dr. Scott:

Fantastic. And can you give us an idea, you mentioned a few of the different types of devices there are. Can you highlight some of the most commonly used ones and which ones you feel are most successful?

Dr. Herndon:

Yes, I think it's important to look at the anatomy that we're targeting. If you look at trabecular bypass, so there are several devices looking at bypassing the area of resistance, or Schlemm's canal. There is the iStent, there is a Hydrus device, there are ab interno trabeculotomies that are going inside the angle and opening the drain up such as a GATT procedure, there's a TRAB 360. So, a lot of these newer MIGS, most of them are actually targeting that trabecular meshwork space to try to unroof Schlemm's canal, to decrease the resistance of outflow, so the collector channels, internal collector channels, are opening up again. So, others, there's suprachoroidal space, the CyPass device which was just approved is targeting. There's the subconjunctival space. There's the XEN gel implant is targeting that space. And finally, there's a ciliary process space, the endocycloablation, is felt to be a MIGS procedures. So, you have 4 different areas, anatomical areas, where these MIGS procedures can work. The key feature of all these is that there's conjunctival sparing. So, none of these procedures involves making an incision in the conjunctiva. So, none of these precludes doing more involved traditional surgery in the future, if necessary.

Dr. Scott:

Does it work the other way around? If you have a patient you've done the traditional IOP-lowering surgery on and need a couple of extra lowering pressure points, can you go back and do some of these procedures as well?

Dr. Herndon:

Yes, certainly. If the main mechanism is the open angle process and let's say your trabeculectomy bleb has failed and the patient had mild-to-moderate disease, then that may be a patient you want to consider trying to open up their angle, to try to get internal filtration established again before you go to another traditional procedure.

Dr. Scott:

Okay. Fantastic. So, I'm one of your patients. I'm sitting here and these devices are relatively new. Can you go over what's your typical informed consent process that you talk to the patient about?

Dr. Herndon:

Sure, Dr. Scott. So, these new procedures have been in the use of surgeons maybe less than 5 years, but I think these give you an opportunity to have a safer procedure with fewer complications, quicker visual recovery. Typically they're associated with modest pressure lowering. You won't have significant reduction of pressure like you would with a traditional glaucoma procedure, but I've looked at your exam, and I think that with your mild-to-moderate disease, we can achieve a target level with one of these MIGS procedures. If it doesn't work, if over the years the pressure starts to go up again, then we can consider a more invasive procedure. There can be bleeding with these. So, one of the main risks, particularly the trabecular meshwork procedures, is hyphema, or bleeding in the anterior chamber. So, I want to make sure you stop your aspirin about a week before surgery and stop your anticoagulation. But that is really the main side effect. A potential complication can be some trauma to the Descemet membrane. Again, if the heme is too much, the visualization might be poor, so I might not be able to place an iStent, for instance, but the great thing is that your visual recovery will be typically much more rapid than if I were to perform a traditional procedure.

Dr. Scott:

And are you seeing lowering of the IOP close to target as soon as day one, or how long does it take for you to get your achieved pressure goals?

Dr. Herndon:

Typically 1 day after surgery, particularly, if you're combining these with cataract surgery. There can be the pressure spike that likely is related to viscoelastic, but typically when you follow patients over time, 3 weeks out, 6 weeks out, we're seeing a great reduction of glaucoma medications. That's really one of the great benefits with these procedures. We may not be able to get you off the medications completely, but most patients are able to limit their medication use and get to a safer range long term for you.

Dr. Scott:

So, what do you not like about these procedures?

Dr. Herndon:

We in the glaucoma community always want a procedure that's going to get a pressure of 8 every time. And so, it'd be ideal if we could get lower pressures, but you're limited somewhat by the episcleral venous pressure. So, none of these, particularly the trabecular meshwork approach procedures, will get the pressure lower than the episcleral venous pressure, which is about 10 to 12 mmHg. But, it's all about patient selection. I'm not going to recommend one of these for a patient with severe disease. We're going to go, at that point, to more traditional filtration surgery.

Dr. Scott:

Very interesting. And do we think this is a passing fad, or you think these MIGS procedures are here to stay?

Dr. Herndon:

Oh, absolutely they're here to stay. They are other generations of these MIGS procedures that are coming out and the cataract surgeon, the comprehensive surgeon, I think, is going to be very interested in performing these. The next-generation procedures will probably be more easy to implant than some of the first-generation procedures. So, I clearly think the trend, the pendulum, is swinging towards procedures that are safer, that allow the patient to have better quality of life by quicker visual recovery, by decreasing the medication burden, and so, sure, I think this is here to stay.

Dr. Scott:

Fascinating. Have you been able to combine, since they work by different mechanisms, have you been able to combine 2 different types of MIGS procedures in the same eye?

Dr. Herndon:

Yes, fascinating thought. There are some procedures where you may want to approach the trabecular meshwork, like for instance an iStent or a GATT procedure or a TRAB 360, which increases the outflow of aqueous, but also you might want to perform an endocycloablation to the ciliary processes to decrease the inflow. So, there are some patients, let's say for instance, who don't want to take the added risk of trabeculectomy, that you might want to consider combining two of these procedures. Not a lot of studies about that at this point, but certainly you're able to approach their treatment options, two different mechanisms. So, I think you'll find more literature out there looking at combining these procedures.

Dr. Scott:

Well, Dr. Herndon, thank you for being with us today and providing your thoughts on these minimally invasive glaucoma surgical procedures. I am sold. I'm sure our audience is very excited about the prospect of these for the future.

Dr. Herndon:

Thank you.

Dr. Scott:

I am your host, Dr. Adrienne Scott. Thank you for listening.