10

Frequently Asked Questions

This chapter is dedicated to the most frequently asked questions that I have received over the years from people at all stages of interaction with Trabectome: glaucoma specialists, anterior segment surgeons, MIGS surgeons, optometrists, residents, fellows, and interns. Although many of the answers to these questions are within the previous chapters of this book, for those looking for quick answers to common questions, read on!

What are the indications for Trabectome?

The Trabectome is a micro-incisional canal-based glaucoma surgical procedure that is meant for micro-surgical management of adult and infantile glaucoma. Although it is commonly used for early to moderate glaucoma, it has also been indicated in more advanced glaucoma cases.

Can it be done as a stand-alone procedure?

The Trabectome can be performed as a stand-alone procedure, as well as combined with cataract surgery.

Do the patients have to be pseudophakic?

The Trabectome procedure can be performed when a patient is either psuedophakic, phakic or even aphakic.

Who are ideal patients for this procedure?

The ideal Trabectome candidates have open-angle glaucoma, mild to moderate disease, with a gonioscopically normal appearing angle, in need of IOP reduction to the mid-teen range or about 30% from baseline. Typically, if the patient is controlled on one medication,

there is a strong likelihood that the patient will be able to get off that one medication after Trabectome surgery. There are many more examples of good candidates that do not fit this description. Look to Chapter 3, *Characteristics for Trabectome Success* and Chapter 6, *Real Clinical Cases: Best Candidates* for additional factors.

What factors do you consider when selecting patients for Trabectome?

We performed qualitative research surveying several Trabectome experts to find what they thought mattered most in evaluating a good Trabectome candidate. From this discussion, the areas of importance were the stage of the outflow system, the angle characteristics, the pre surgical history, and the goals and expectations of the surgical outcome. The details of these factors are outlined in Chapter 4, *The MIGS Patient Selection Calculator*.

What kind of preoperative evaluation do you do for glaucoma patients when considering angle surgery?

The preoperative evaluation will include a detailed slit lamp exam of the anterior and posterior segment to conclude the assessment of the type of glaucoma, stage of glaucoma, how well they tolerate topical glaucoma medications, present state of glaucoma (IOP and present medications), angle characteristics through gonioscopic evaluation, prior glaucoma laser and surgical history, and goals for the surgery.

What things on gonioscopy preoperatively would preclude a patient from having Trabectome?

There were some characteristics that were found in our qualitative research of Trabectome experts to be absolute contraindications for Trabectome, which included complete appositional synechial closure, neovascular angle closure, active neovascularization without complete closure yet, and elevated episcleral venous pressure. In addition, during the early phases of learning Trabectome surgery, avoid cases where you are unable to preoperatively visualize the scleral spur during initial gonioscopic inspection of the angle. The scleral spur is the most important consistent gonioscopic landmark

that enables the physician to correctly identify and differentiate trabecular from uveoscleral outflow.

How does Trabectome compare with the other current (MIGS) technologies?

TABLE 1 Comparison chart of the MIGS options.

Comparison of MIGS Options	Need viscoelastic to maintain chamber	Device Fluidics maintain AC & view	Stand Alone & Combo	Established Procedure Code	No implant	Ability to Treat 360 Degrees	Single Unit Disposable Device	Capital Equipment	Preserves TM Tissue	Full TM treatment limits other MIGS
Trabectome		X	X	X	X			X	partial	
GATT	X		X	X	X	X	X			X
Trab360	X		X	X	X	X	X		partial possible	X
Kahook	X		X	X	X		X	X - $ moder-ate	partial	
iStent	X						X		X	
Visco360	X		X	X	X	X	X		X	
ABiC	X		X	X	X	X		X - $ moder-ate	X	
Cypass	X						X		X	
Xen	X						X		X	

Why should I use the Trabectome procedure versus iStent?

I would not advocate telling you to choose only one MIGS procedure, as I am a strong proponent of learning as many MIGS procedures as feasible. Glaucoma is not a one-size-fits all disease and each patient's management is very individualized. Just as you would not limit yourself to one class of glaucoma medication or one type of IOL, I like having as many tools in my pocket to deliver the best treatment plan.

That being said, I do routinely at present find more scenarios to choose Trabectome than the commercially available single iStent. Since Trabectome is a stand-alone procedure, it produces more options for pseudophakics and patients with asymptomatic cataracts in need of IOP lowering only. I also find that the iStent, in my hands, is best suited for patients with ocular hypertension to mild glaucoma, and often with well controlled IOP where the goal is reducing medications. I also tend to favor iStent in mild glaucoma patients in whom I have significant concern of bleeding or inflammation. Post-surgery cases after iStent tend to have minimal heme and inflammation. Trabectome can also provide good outcomes for these patients, as well as in cases of moderate to severe glaucoma, but the heme potential and inflammation in some cases can be more than that seen with iStent.

Overall, I find the Trabectome useful in all ranges of the glaucoma spectrum and my choice to use Trabectome is more driven to control the glaucoma, as opposed to maintaining it. Though studies have shown that the effectiveness of two or more iStents is significantly better than just one, as cost for most patients is a major factor, I have not at present offered off-label use of the iStent where I would perform more than one stent at a single time or place it in a pseudophakic patient.

Is the Kahook dual blade like a Trabectome? Similar results/ success?

The Kahook Dual Blade (KDB) is a single-use device that enables one to perform goniotomy, or partial removal of trabecular meshwork (TM) and IWSC to expose the collector channels that line the back wall of Schlemm's canal (SC). This is similar to the mechanism of

action of Trabectome. Where they differ is that with Trabectome, its system provides continuous irrigation and aspiration. The irrigation provides fluidics that maintains the anterior chamber depth throughout the procedure such that internal viscoelastic (VE) is not needed. This aids tremendously with having an excellent view through fluidic pressurization that keeps the cornea free of corneal folds, prevents egress of heme through SC during the procedure so you can see the tissue well, and the fluidics help with the removal of ablated TM tissue that is continually being aspirated.

The KDB is a single-use device that allows for precision cutting of the TM. After a two directional incision, the strip of excised TM tissue is manually removed. Also, viscoelastic needs to be used during the procedure to maintain the chamber pressure for visualization of the angle. This VE may egress out of the wound during the procedure leading to a lower pressure and bleeding through TM that has been incised. There is a cost difference between the single use KDB device and the Trabectome system that needs to be purchased to use the single use Trabectome hand piece.

In regards to the results, my success with Trabectome has been similar to what has been reported of long-term success around 80-85% of the time. I have been using Trabectome for seven years now. I have over one year experience with the recently launched Kahook Dual Blade and in my hands I have seen positive results, but time will tell. My main concern is with the wound healing for the cleft created as in my technique, there is a less than ideal clean removal of the TM. I do not know what role this will play on the long-term wound healing and stability of the cleft created.

What is the best MIGS procedure to start practicing with for a beginner?

It is difficult to answer this question. I feel whichever MIGS procedure you start on, if you master it, this will ultimately give you the foundational tools needed to become successful in any of the MIGS procedures. I started with the Trabectome and took time to master it. Subsequently, my adoption of additional MIGS procedures has

been fairly straightforward because of the fundamentals I learned in Trabectome.

In actuality, I cannot say for certain though, that this would have been the same if I began with other techniques. The main reason is that because the Trabectome fluidic system offers constant pressurization of the chamber through irrigation and aspiration, it provides me with such an adequate view of the angle through a clear cornea. I did not have to spend as much effort on the steps with intraocular VE to maintain the chamber. This can be crucial in the novice stage where you can be very unclear of the anatomy and very hesitant to 'make the move'. While this hesitation is occurring, the VE that was pressurizing the eye can begin to ooze out, and there goes the chamber and the view, with folds in the cornea and bleeding from SC if an attempt to pierce the TM has already been made. You could have been right at that moment where you were going to engage in the TM, but then the view goes! You have to come out and refill the chamber with VE and hope that the clear view comes back again.

Therefore the two main features of Trabectome that makes the procedure easier to adopt as a first MIGS are:

1. Irrigation and aspiration provides better visualization due to stabile AC and not using VE so the angle view is optimized,
2. The TM is ablated and aspirated, not manually removed, therefore there is a certainty of removing the TM with a clean and assured cut.

In my opinion, it is easier to learn MIGS with Trabectome as the first procedure. However, I may be biased as I learned Trabectome first and I find my adopting other procedures relatively easy.

Why choose a MIGS procedure instead of a non-incision procedure such as SLT to control IOP in cataract surgery patients?

In glaucoma management typically there is always more than one option and typically a pretty good argument for each. The answer really is that it depends. It depends on the stage of the disease and the need for IOP control. It also depends on factors relating to time. Is there time to trial try SLT to see if it will work prior to performing

cataract surgery? Since with the Trabectome the removal of TM is only partial, an SLT can still be performed afterwards for additional IOP control, which is simpler than having to go back to the operating room. If an SLT that is performed in conjunction with cataract surgery does not work, the patient may then be in need of another operational surgery. So really it depends, and either way could be validated.

Are you able to make money with this procedure?

YES. In the clinical setting, by performing more gonioscopy, you are not only following Preferred Practice Patterns for all types of glaucoma, and sharpening your skills to evaluate the angle, you are also billing charges that are not subject to tier reimbursement, meaning that you can gain full reimbursement even when you have ordered other tests like a visual field or OCT-G.

So as your understanding of the indications for gonioscopy increase, your use will increase, and so will your reimbursements. Also the more you look at the angle, you will take better care of your patients, and the more you will find in regards to patients needing additional treatments, like laser for narrow angles. See Chapter 5, *Gonioscopy Overview*, to gain more details.

As a Trabectome surgeon, there are also additional benefits financially that can be gained when this technique is utilized for your glaucoma patients. The ASC reimbursement for several MIGS procedures, including Trabectome, are equal to that of a tube shunt, but can take less time with the proper angle surgery skill set. The reduced time to perform MIGS procedures, like Trabectome, alone or in combination with cataract surgery compared to traditional surgeries yields more efficiency and better reimbursement. See Chapter 2, *Advantages and Disadvantages: What Can Trabectome Do for Me?*, for additional details.

Is there certain coding that is approved for the Trabectome, or do all types of glaucoma qualify?

The Trabectome can be coded either as a trabeculotomy CPT Code 65850 or as a goniotomy CPT Code 65820. What is the difference? The

trabeculotomy code has a slightly higher physician reimbursement ($854.14 in 2016), but the 2016 ASC reimbursement is $976.17. The goniotomy code has a slightly lower physician reimbursement ($761.34), but the ASC reimbursement almost doubles at $1793.90. This can be a large selling point if you are operating at an ASC who is evaluating purchasing the Trabectome system (Medicare, 2016).

What has been the reaction from the patients?

Patients have been overwhelmingly happy with the Trabectome procedure, both in the operating room setting and post-operatively. There is minimal to no pain, the limitations are very similar to cataract surgery. They love the opportunity to better control their glaucoma and to get off or reduce drops. See real testimonials from some of my patients in Chapter 1, *Advantages and Disadvantages: What Can Trabectome Do for Me?*

How long does the Trabectome effect last?

I have been performing Trabectome surgery for seven years now spanning work at two institutions. The longest I have seen is stabilization for six years. There is also literature that spans nine years showing stability of IOP and medication reduction during that time period (Mosaed *et al.*, 2014). I think the secret is in the wound healing. If one can adequately control wound healing and prevent synechia formation or fibrotic closure of the cleft, the procedure can last for years.

Is it more beneficial, with regards to IOP lowering, to do Trabectome-alone or in combination with cataract extraction?

Studies show that both methods can work well to lower IOP, however, there is an advantage to the success of the long-term outcomes that occurs in Trabectome combined with cataract surgery. Whether that is due to the added effect of cataract removal, larger angle depths that help prevent synechial formation, or that the class of patients who tend to have combined procedures are the less advanced or better controlled glaucoma, where the driving factor for surgery is likely the cataract.

Is Trabectome easy to perform?

With any new procedure, there is a learning curve. The more comfortable you are with looking at the angle anatomy, the easier it will be to identify the TM and know where to approach. The more comfortable you are with the hand and microscope positioning required for angle surgery, the easier it will be for you to have control to perform the steps. As mentioned previously, before starting Trabectome surgery, consider purchasing the Trabectome goniolens and start practicing in the operating room with the totally different feel of angling the patient's head and microscope along with balancing the goniolens on the patient's cornea in order to view the angle.
The three most common errors, by far, are:

COMMON ERROR 1:

Excessive pressure on the cornea with the goniolens that creates striae and a poor view.

COMMON ERROR 2:

Failure to get comfortable with your ergonomic positioning.

COMMON ERROR 3:

Failure to perfectly align your view of the angle in order to best incise the TM and IWSC.

How many procedures does it take before you become comfortable with Trabectome?

I would say that it takes ten procedures to feel comfortable, but about 30 procedures to be accurate and get good, consistent results.

Can you really reduce the number of medications after Trabectome? If so, how many on average?

Yes. It is routinely possible to reduce medications. Typically you can reduce the medications by one (~ 33%). This can be more. Sometimes I can remove one medication completely and then reduce another by its frequency (i.e., from three times daily to one time AM).

What do you say when you consent the patient for a Trabectome? What is the success rate/risks/amount of pressure lowering?

When I consent the patient for Trabectome I discuss the reason why I am recommending it, how the procedure works and the post-operative expectations. I will let the patient know that although the surgery has the potential to work very well and only takes five to ten minutes, this is still real surgery and there is no guarantee of complete success. There is a risk of bleeding, infection, prolonged inflammation, elevation of your eye pressure or need for additional medications or surgery to control the glaucoma. The success rate of the Trabectome is about 80-85%. See Chapter 8, *Practical Tips for the Doctor-Patient Discussion*, for additional dialogue between doctor and patient.

Does a history of ALT or SLT affect choice/success of Trabectome?

Having previous trabeculoplasty, whether with ALT or SLT, does not preclude one from having Trabectome. There may be synechia present in the angle, which is easily lysed with the flat tip of the hand piece. There can actually be benefit in having prior trabeculoplasty, as its mechanism of action provides improved aqueous flow through the outflow system, which over time can help with the maintenance of the systems functions. This can be beneficial to the success of the Trabectome, where the mechanism is removing clogged TM tissue that is causing resistance to outflow. Once the TM is removed from a functioning outflow system, there is room for significant IOP reduction.

Is Trabectome effective after failed trabeculectomy or tube shunt?

Yes. I have found this to be true clinically and it has been reported in the literature as well (Mosaed *et al.*, 2015). A category of an excellent Trabectome candidate is one in whom previously had trabeculectomy or tube shunt surgery has failed and requires IOP lowering. This can be done as a stand-alone Trabectome or combined with a patient who also has a visually significant cataract.

Do you stop blood thinners in these patients?

I try to stop blood thinners in all my Trabectome patients prior to surgery. People often do not think of baby aspirin or NSAIDs as blood thinners, so it is important to ask if they take these among the list of other common thinners, like Coumadin, Plavix or warfarin.

What is the recommended post-op drop regimen?

The recommended post-operative drop regimen includes use of a steroid, antibiotic, and NSAID. Use of Pilocarpine or cycloplegia has been suggested with variations in opinions. Use of pre-surgical glaucoma drops are recommended post-operatively, but there are variations in opinions of the exact regimen. See Chapter 1, *Understanding Trabectome*, for more detailed discussion on the post-operative drop regimen.

What is the concept of using pilocarpine or atropine post-operatively?

Pilocarpine has been advocated to be used post Trabectome to aid in pulling iris tissue away from the angle to prevent PAS formation. Due to issues of prolonged inflammation after Trabectome, a few years ago I removed routine pilocarpine from my post-operative regimen and began using a few drops of cycloplegia (atropine) instead. Cycloplegics deepen the anterior chamber, which can be augmented by cataract removal. I found that the wound healing was better and I saw less PAS formation. See Chapter 2, *Understanding Trabectome*, for more detailed discussion the post-operative drop regimen.

At what post-operative time point should you perform gonioscopy to look at the cleft made by the Trabectome?

There is no set routine time that I look at the angle. I do typically look at the angle within the early post-operative period to assess the cleft structure and patency.

I do perform gonioscopy when there is:

- an elevated IOP;
- prolonged inflammation;
- prolonged or recurrent microhyphema;
- a progressive change on clinical exam.

What should you be looking for on gonioscopy?

Pre-operative gonioscopy evaluation should consist of evaluating angle characteristics, through the angle depth, presence of secondary angle characteristics (i.e., pigment, synechia, neovascularization), and the cloudiness of the cornea. Post-operative evaluation should reveal an open cleft revealing the posterior wall of SC for 2-4 clock hours in the nasal quadrant. I stress the importance of looking at the angle for patency of the cleft, presence of heme, early PAS formation, and development of pigment mottling, or membrane formation in/over cleft.

Will Trabectome procedures cause PAS or long-term damage to the trabecular meshwork?

Any goniotomy procedure has the potential to be followed by PAS formation, as the area of the TM is incited to produce inflammatory factors once it is ablated. It is not a given that PAS formation will develop. I have looked at many long-term post-operative post-Trabectome angles and found no PAS. Just as there is permanent removal of iris tissue in a trabeculectomy, there is also permanent partial removal of the TM in the area of Trabectome ablation, or other TM removal angle surgeries (Trab360, GATT, Kahook). There may be long-term damage to the canal after Trabectome surgery, especially if the back wall is damaged during the procedure by pushing the tip into the back wall of SC forcefully.

Do positioning issues, such as neck/back problems, necessarily exclude a patient from having angle surgery?

I personally have not turned any patient away from Trabectome due to a positioning issue. Usually there is a way around it.

Should I expect hyphema post-operatively?

I would not expect a gross hyphema post-operatively, but I would be prepared for it if it happens. The majority of the time post-operatively there is no significant hyphema, a microhyphema or a small of amount of blood in the canal is common. This is expected as blood reflux through SC occurs when the IOP drops. Let patients know that this can cause fluctuation and haziness in vision until it clears.

Is there a wet lab to practice Trabectome techniques?

Yes. Wet labs are typically part of formal Trabectome didactic training and certification programs. To find out when the next program is near you, go to **www.trabectome.com/Learning/TrabectomeTraining/Register** and click on *Physician - Training* to register.