

PROS VERSUS CONS OF PRESERVING TRABECULAR MESHWORK IN THE TREATMENT OF GLAUCOMA: PART 2

In the second installment of a two-part debate, a panel of glaucoma specialists explain why options for trabecular meshwork removal have a role in glaucoma management.



Having a variety of MIGS procedures is assuredly a good thing, but the amount of options contributes to a very good

problem to have: How do we properly employ the various options to the maximal benefit of the patients under our care?

As we think about where the various MIGS surgeries fit in the treatment paradigm, one of the questions that continues to arise is whether it is better to preserve the trabecular meshwork (TM) tissue—several lines of research have revealed new insights on the TM tissue and its role in maintaining IOP—or whether we should favor TM removal—it is, in essence, diseased tissue and potentially an obstacle to physiologic aqueous flow dynamics.

In a previous article, Shamil Patel, MD, MBA, and Mahmoud A. Khaimi, MD, offered their perspectives on why they prefer procedures that spare the TM wherever possible. To round out this discussion, Georges M. Durr, MD, FRCS, and I. Paul Singh, MD, take the ‘pro-tear’ side, offering their perspectives on why TM removal or stripping procedures have an important role in the management of glaucoma (See Figure; Scan the QR code to watch a video of the discussion). I will offer the same caveat that I offered with

the first installment of this debate: In the following we are speaking in generalities, and patient-specific factors appropriately steer our decision-making in the clinic. And I will add another caveat: This discussion was not intended to be a debate in the sense of one side attempting to prove the other side wrong; rather, this discussion is intended to move the field forward, and to offer perspectives that can inform decision-making for patients.

To spare or tear the TM? That is the question.

—Iqbal Ike K. Ahmed, MD, FRCS

WATCH NOW



Iqbal Ike K. Ahmed, MD, FRCS: Let's start with the obvious question. When do you think about removing the TM tissue?

I. Paul Singh, MD: As someone who likes having multiple options at my disposal, I have to concede a point in this debate: Because the TM has a role in regulating outflow facility, it makes sense to preserve the physiology of the eye as much as possible. In a perfect world, we would be able to restore function to the drainage system, get everything back online, and send the patient home happy. But that's often not the case with glaucoma. There are multiple stages and severities, and there are multiple glaucoma subtypes. Glaucoma is a family of optic neuropathies, not a single entity; nor will every eye respond to treatment the same way. And so, there is strong rationale to having options for TM removal for certain cases, for example, if the TM is completely diseased, fibrotic, scarred down, or there is loss of function where it may not be able to

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Georges M. Durr, MD, FRCSC:

There are a few other scenarios in which trabecular removal may be warranted, for instance younger patients with pigmentary glaucoma and older patients with pseudoexfoliative glaucoma in whom pigment is blocking the outflow. There may also be a role in uveitic patients and those with juvenile open-angle glaucoma—it is still to be determined if tearing of the TM is perhaps better for those patients rather than putting in stents or any sort of hardware in the eye.

Dr. Ahmed: How much of the TM are you removing?

Dr. Singh: I tear 180° typically. I have done a few cases of 360° removal, but I have also had a few of those cases result in a bad hyphema. There is a much lower risk (of hyphema) with a 180° removal.

Dr. Durr: We looked at our data and did not see a huge difference in IOP response in cases where we removed 180° compared to 360° (unpublished data). Even beyond the data, though, I like the idea of preserving some of the TM because of its role in responding to pressure elevations. I don't think we fully know how much of the TM we need to open to gain access to distal drainage. If I am removing for 360°, I think the next step is going to be a trabeculectomy, but for the majority of patients, 180° is enough.

Dr. Ahmed: Once we get past 4 or 5 clock hours of removal, the resistance plateaus.¹ But in some eyes, for instance in juvenile and young patients, there is a different mechanism to the glaucoma, and so 360° removal might be necessary.

Dr. Singh: There may be a middle ground, as well, in that there may be

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— Georges M. Durr, MD, FRCSC

benefits to performing canaloplasty with the trabeculotomy. Perhaps in those situations you titrate how much of the TM you remove—maybe it's only 90° or 180° just to remove a section of the tissue. The point is, depending on the severity of the glaucoma and other factors like the number of medications and based on signs of progression, we may have to tailor the intervention, and that may mean multiple procedures to achieve outflow. Note: iTrack is not cleared for goniotomy or trabeculotomy procedures.

COMBINATION PROCEDURES

Dr. Ahmed: Dr. Durr, you are an advocate of combining canaloplasty with gonioscopy-assisted transluminal trabeculotomy. What is your rationale for that?

Dr. Durr: My basic rationale is to think about what procedure or combination of procedures is going to provide the most benefit during a single surgery. Some patients respond quite well after tearing the TM. One example that comes to mind is a young patient on a number of medications with uveitic glaucoma with high IOP. If you try a filtering procedure in that setting, you

might worry about hypotony or risks to ciliary body function. If you think about a tearing procedure, you might be concerned about a risk for bleeding, but you are also probably delaying the need for more invasive surgeries. We tend to think about matching the procedure to the patient, and that is ideal; I would just add that sometimes we should think about matching the best combination of procedures to the patient if there is a good chance we only have to go to the OR once, or if we are at least putting off the need for future procedures until the longer term.

Dr. Ahmed: What is your typical technique when you combine canaloplasty and trabeculotomy? How many clock hours or how many degrees are you typically opening?

Dr. Durr: I perform canaloplasty over 360° typically and then a hemi-tearing technique. I remove half of the TM because there may be some residual function.

Dr. Ahmed: In which direction are you viscodilating when you combine it with a trabeculotomy?

Dr. Durr: If I am performing canaloplasty without a trabeculotomy,



Figure. Shown from left to right, Drs. Patel and Khaimi, who take the “pro-spare” side in the previous Part I article, along with Drs. Ahmed, Durr, and Singh, discuss iTrack by Nova Eye Medical at the Interventional Glaucoma Congress in Chicago in 2021.

I do about three to four clicks per clock hour as I am retracting the microcatheter. However, if I plan to do a trabeculotomy, I perform viscodilation going forward and then tearing on the way back, just for the sake of doing a quicker surgery.

PERSPECTIVES ON PATIENT SELECTION

Dr. Ahmed: How do you decide if you are doing a sparing or tearing

procedure? What factors come into your consideration?

Dr. Durr: I think about sparing the TM in a patient with controlled disease where the objective is to reduce the medication burden and/or achieve a small amount of pressure lowering. I think more about tearing procedures for patients with more advanced disease, for those with higher starting pressure, and for specific glaucoma subtypes like

uveitic glaucoma and congenital or pediatric glaucoma.

Dr. Singh: There are real advantages to sparing the TM when possible. For me, canaloplasty with iTrack (Nova Eye Medical) is the ideal procedure if we want to be minimally invasive and attempt to restore functionality to all the structures in the conventional outflow pathway for 360°, which also impacts on distal drainage by clearing obstructions in the collector channels. If that is the starting point, then deciding on a tearing procedure comes down to thinking about who is most likely to benefit. And the answer to that is when there is pathology in the trabecular tissue—uveitis, juvenile glaucoma, and pigmentary or pseudoexfoliative glaucoma. Even in those scenarios, though, I am more cautious about removing the TM in a phakic eye unless it is advanced glaucoma or if the patient is on four or five medications. You just don’t know if that patient may develop a cataract in the future and might need

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a stent, so I like to keep my options open. In pseudophakic eyes, the priority shifts to reducing medication burden wherever possible. We recently reviewed data on TM-removal procedures in pseudophakic eyes and found that 180° removal versus 90° was associated with greater reduction in drops (unpublished data). Based on that, the number of medications becomes a consideration for whether I tear the TM and how much is removed.

Dr. Ahmed: What about for MIGS and cataract combination cases? Does the same thinking apply?

Dr. Singh: In that setting, I look at the severity, the starting pressure, and the number of medications, and again, the emphasis is on reducing medication burden if possible. I recently had a patient with an IOP of 35 mm Hg on five medications where I performed canaloplasty, removed 180° of TM, removed the cataract, and placed a stent. The thinking there was to maximize outflow by combining the different technologies. Another scenario in which I will think about incorporating canaloplasty to a combination cataract and stent procedure is if the patient had a previous selective laser trabeculoplasty without much response. That, to me, is an indication that there would be a benefit to addressing the pathology distal to the TM, for example, the Schlemm canal, and the collector channels. Note: iTrack is not

cleared for use in combination with micro-trabecular bypass stent surgery.

FINAL THOUGHTS

Dr. Ahmed: Treatment guidelines for glaucoma have long advocated individualizing treatment choices while considering the safety, efficacy, and potential impact on quality of life of our various interventions. It seems that guidance was ahead of its time. Really until the advent of the MIGS category, we did not have the tools to achieve that laudable goal. Now, though, we can think about the needs of individual patients and then use the MIGS procedure—or procedures—that will provide the greatest benefit. We can also entertain a wider range of endpoints. Yes, we still want to gain control of the disease, stop progression, and achieve target pressure to give the best chance of avoiding irreversible damage to the optic nerve. But we can also intervene with the idea of lowering medication burden, and as a result, have a meaningful impact on quality of life. It is indeed an interesting time in glaucoma management when we can think about how our interventions can positively impact patients' quality of life rather than devise strategies to minimize the potential for the intervention, or the disease itself, to have a negative impact on patients' quality of life. ■

1. Rosenquist R, Epstein D, Melamed S, et al. Outflow resistance of enucleated human eyes at two different perfusion pressures and different extents of trabeculotomy. *Curr Eye Res.* 1989;8(12):1233-1240.

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IMPORTANT SAFETY INFORMATION

iTrack™ has a CE Mark (Conformité Européenne) and US Food and Drug Administration (FDA) 510(k) # K080067 for the treatment of open-angle glaucoma.

INDICATIONS: The iTrack™ canaloplasty microcatheter has been cleared for the indication of fluid infusion and aspiration during surgery, and for catheterization and viscodilation of Schlemm's canal to reduce intraocular pressure in adult patients with open-angle glaucoma.

The iTrack™ canaloplasty microcatheter is currently not 510(k) cleared for use with the ab-interno technique in the United States.

CONTRAINDICATIONS: The iTrack™ canaloplasty microcatheter is not intended to be used for catheterization and viscodilation of Schlemm's canal to reduce intraocular pressure in eyes of patients with the following conditions: neovascular glaucoma; angle closure glaucoma; and, previous

surgery with resultant scarring of Schlemm's canal. **ADVERSE EVENTS:** Possible adverse events with the use of the iTrack™ canaloplasty microcatheter include, but are not limited to: hyphema, elevated IOP, Descemet's membrane detachment, shallow or at anterior chamber, hypotony, trabecular meshwork rupture, choroidal effusion, Peripheral Anterior Synechiae (PAS) and iris prolapse.

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