The common denominator in the surgical treatment of glaucoma is decreasing IOP. This reduction is accomplished in a variety of ways, however, and certain methods may be more appropriate in a given patient, depending on disease severity, the type of glaucoma, the target IOP, the presence or absence of a visually significant cataract, and the patient’s tolerance of medication.

There are four routes by which to surgically lower IOP:
1. increase trabecular outflow
2. increase uveoscleral outflow
3. decrease aqueous fluid production
4. increase aqueous outflow into the subconjunctival space

The category of microinvasive glaucoma surgery (MIGS) includes the first two of these routes and possibly the third. Subconjunctival filtration is generally not considered part of MIGS, however, owing to the application of antifibrotic agents and the formation of a filtration bleb. Some are referring to these procedures as hybrids. Trabecular surgery, the focus of this article, can take five forms (Table).

### CASE PRESENTATION

A 45-year-old woman was diagnosed with pigmentary glaucoma 1 year prior to presentation. The patient had moderate optic nerve damage with corresponding visual field loss and retinal nerve fiber layer thinning. She underwent selective laser trabeculoplasty 1 year ago and is currently using maximum topical medical therapy in the form of a prostaglandin analogue and a fixed combination of a β-blocker and a carbonic anhydrase inhibitor. Her IOP measures in the low 30s, and she exhibits progressive visual field loss.

Clearly, this patient requires surgical management. During the preoperative discussion, she mentions that she is a yoga instructor with an active lifestyle and that she is worried about undergoing traditional glaucoma filtration surgery such as trabeculectomy or the placement of a tube shunt. Because of her concerns, the patient and I decide to proceed with an ab interno trabeculotomy using the Trabectome (NeoMedix). Three months postoperatively, the prostaglandin is stopped. Six months after surgery, her IOP ranges from 15 to 17 mm Hg on a single aqueous suppressant (see Watch It Now).

This case demonstrates the utility of trabecular MIGS for the management of glaucoma. Several points illustrated

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**TABLE. THE FIVE FORMS OF TRABECULAR MIGS**

<table>
<thead>
<tr>
<th>Form</th>
<th>Device or Procedure (Manufacturer)</th>
<th>FDA Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trabecular bypass stenting</td>
<td>• iStent Trabecular Micro-Bypass Stent (Glaukos)</td>
<td>• Yes</td>
</tr>
<tr>
<td></td>
<td>• iStent Inject (Glaukos)</td>
<td>• No</td>
</tr>
<tr>
<td></td>
<td>• Hydrus Microstent (Ivantis)</td>
<td>• No</td>
</tr>
<tr>
<td>Viscodilation of Schlemm canal</td>
<td>• ABiC (Sight Sciences)</td>
<td>• Yes</td>
</tr>
<tr>
<td>Trabecular ablation</td>
<td>• Trabectome (NeoMedix)</td>
<td>• Yes</td>
</tr>
<tr>
<td>Trabecular removal</td>
<td>• Kahook Dual Blade (New World Medical)</td>
<td>• Yes</td>
</tr>
<tr>
<td>Trabeculotomy by internal approach</td>
<td>• Trab360 (Sight Sciences)</td>
<td>• Yes</td>
</tr>
<tr>
<td></td>
<td>• GATT</td>
<td>• Yes</td>
</tr>
</tbody>
</table>

Abbreviations: MIGS, microinvasive glaucoma surgery; ABiC, ab interno canaloplasty; GATT, gonioscopy-assisted transluminal trabeculectomy.
Recent studies have shown the approach to be effective in secondary glaucomas.”

by this case make this type of surgery ideal as a first-line treatment: its safety, efficacy as a standalone procedure, ability to treat high IOP, and ability to treat secondary glaucomas.

SAFETY
Multiple studies have demonstrated the safety of trabecular MIGS, especially compared with traditional glaucoma filtration surgery such as trabeculectomy. The excellent safety profile of trabecular MIGS procedures makes them an excellent option for first-line surgery in patients with uncontrolled IOP and even those whose IOP is controlled on medications.

STANDALONE PROCEDURE
Many patients with uncontrolled IOP and glaucoma are either phakic without a visually significant cataract or pseudophakic. As the case example illustrates, the efficacy of trabecular MIGS is excellent in these scenarios even when not combined with cataract extraction. That said, it is important to recognize that this is an off-label use of some procedures such as trabecular microbypass stenting.

HIGH IOP
Surgeons may be reluctant to treat patients who have very high baseline IOPs with trabecular MIGS procedures. These ophthalmologists cite the percentage IOP reduction from clinical trials (approximately 25%-30%) as evidence that IOP lowering will be inadequate. My colleagues and I, however, presented an analysis of patients with medically treated baseline IOP above 30 mm Hg who underwent trabecular ablation. We found an excellent success rate. Mean IOP decreased from 35.6 ±6.3 before surgery to 16.8 ±3.8 mm Hg 1 year postoperatively (55% reduction), with a 42% average reduction of glaucoma medication. It appears that the end result in terms of IOP may be independent of the baseline IOP.

SECONDARY GLAUCOMAS
Although most original trials of trabecular MIGS reported results in primary open-angle glaucoma, more recent studies have shown the approach to be effective in secondary glaucomas such as pseudoexfoliation, pigmentary, steroid-induced, uveitic, and traumatic glaucoma. These findings expand the indications of these procedures and make them an option for the management of patients with most types of glaucoma. Even chronic angle-closure glaucoma can be treated with trabecular MIGS, cataract extraction, and the lysis of goniosynechiae. The only truly exclusionary diagnosis is neovascular glaucoma.
CONCLUSION
Trabecular MIGS procedures are an ideal choice for the first-line treatment of glaucoma because of their excellent safety profile, their efficacy for secondary glaucomas and high baseline IOP, and their utility as a standalone procedure or in combination with cataract extraction. Trabecular MIGS is an appropriate choice for patients with uncontrolled IOP; those whose IOP is controlled on multiple medications; and patients who are phakic, who are pseudophakic, or who have a visually significant cataract.


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