

THE FUTURE OF GLAUCOMA MANAGEMENT

Titratable strategies offer safe, individualized treatments.

BY THOMAS W. SAMUELSON, MD



Glaucoma management has changed significantly over the past few years with the introduction of microinvasive glaucoma surgery (MIGS). Undoubtedly, glaucoma treatment will continue to evolve as surgeons gain experience with MIGS and the numerous pharmacologic and surgical therapies currently in development come to market. With

the addition of less invasive, safer—albeit less efficacious—alternatives to traditional filtration procedures, glaucoma surgeons can offer patients individualized and more titratable treatment strategies.

INITIATING GLAUCOMA STRATEGIES

For the vast majority of glaucoma patients, treatment begins with either pharmacotherapy or laser trabeculoplasty. Both options are generally noninvasive and have an excellent safety profile.^{1,2} Depending on the degree to which IOP must be lowered, patients may be prescribed one or multiple drops. When possible, I prefer to treat mild to moderate glaucoma in phakic eyes with pharmacologic and/or laser therapy until the patient develops a visually significant cataract. At that time, I manage the glaucoma and cataract surgically. Although phacoemulsification alone lowers IOP in most individuals,³ I incorporate methods that are synergistic to cataract surgery to further improve physiologic outflow. Accordingly, I boost the favorable effects of phacoemulsification by placing an iStent Trabecular Micro-Bypass Stent (Glaukos) at the time of cataract surgery. This safe, canal-based procedure enhanced IOP lowering without affecting the visual acuity or refractive outcomes of the cataract surgery.^{4,5} The stent helps restore the natural physiologic outflow, spares the trabecular meshwork, and uses the natural episcleral venous pressure of 8 to 11 mm Hg to eliminate the risk of hypotony.⁶ This natural safety net prevents eyes from reaching IOPs in the single digits. While some patients may have a target IOP in the single-digit range, the overwhelming majority of patients do not need pressures that low. Eliminating the possibility of single-digit IOPs adds to the safety of the procedure. While I prefer a canal device to combine with phacoemulsification, some surgeons prefer to ablate the inner wall with devices like

the Trabectome (NeoMedix).

There are patients in whom phacoemulsification with the iStent alone may not provide adequate IOP reduction, yet I want to use this technology because of its safety profile. When a single stent does not provide an adequate response, I add a realistic medical regimen that I call “minimally invasive sustainable therapy” or MIST. This is a premeditated approach that I map out preoperatively with the patient. I tell him or her to expect to use a drop or two postoperatively. In this approach, I plan to maintain the patient on no more than two topical hypotensive medications, perhaps a single drop each morning and evening. In my opinion, enhanced MIGS (MIGS plus MIST) allows surgeons to offer canal-based glaucoma surgery to a wider range of patients, including those with moderate or more advanced glaucoma.

BEYOND INITIAL THERAPY

The iStent is currently the only available microstent for placement within Schlemm canal. Other MIGS devices are in development, including the Hydrus Microstent (Ivantis) and the iStent Inject (Glaukos). The Hydrus is an 8-mm device that both tensions the canal and provides a direct inlet to the canal. The iStent Inject is even smaller than the first-generation iStent. The former comes preloaded with two stents and is intended for placement in conjunction with phacoemulsification or as a stand-alone procedure.



AT A GLANCE

- The stent helps restore the natural physiologic outflow, spares the trabecular meshwork, and uses the natural episcleral venous pressure of 8 to 11 mm Hg to eliminate the risk of hypotony.
- Patients who have disease distal to the canal or angle-closure glaucoma can benefit from devices that access the suprachoroidal space.
- The iStent is synergistic with phacoemulsification as well as future sustained-release drug systems.

A pan-European, prospective, unmasked study of 99 patients with open-angle glaucoma uncontrolled on at least two topical medications underwent implantation of two iStent Inject devices.⁷ Twelve months postoperatively, 66% of subjects achieved an IOP less than 18 mm Hg without medication. When combined with those patients who needed a single medication (the equivalent of MIGS + MIST as referenced earlier), a total of 81% of patients achieved an IOP under 18 mm Hg. Overall, the mean IOP decreased by 10.2 mm Hg from baseline washout to month 12. The ability to place multiple stents in a single procedure or place additional stents at a later date makes the iStent a titratable therapy that is adjusted according to each patient's unique needs.

A MORE DEFINITIVE APPROACH

For patients with advanced glaucoma, including those in whom further disease progression will mean a significant loss of functionality, I am far more willing to move to riskier procedures. These patients include individuals with extremely high pressures or anyone whose fixation is threatened on both sides of the horizontal midline. The current option at this stage is trabeculectomy with or without the Ex-Press Glaucoma Filtration Device (Alcon) or an aqueous drainage device such as the Baerveldt glaucoma implant (Abbott Medical Optics) or Ahmed Glaucoma Valve (New World Medical). These procedures may be challenged relatively soon by devices currently en route toward FDA approval. The iStent Supra (Glaukos), and the CyPass Micro-Stent (Transcend Medical) access the suprachoroidal space to provide additional, adjunctive IOP lowering beyond that achieved with primary trabecular bypass stent treatment. The Xen45 procedure (AqueSys) is a novel approach to the subconjunctival space using an ab interno approach, whereas the InnFocus Microshunt (InnFocus) employs an ab externo approach. Each of these procedures may achieve more aggressive target IOPs due to the fact that they completely bypass the natural resistance of the episcleral vasculature. Another advantage of these devices is their potential for use in cases with disease distal to the canal or in which the angle is compromised such as angle closure not remedied by iridotomy or phacoemulsification.

I am hopeful that these approaches will push trabeculectomies and transscleral long tubes farther down the treatment algorithm. Exactly where these innovations will fit into the treatment schema will largely depend on their safety profile.

CONCLUSION

I prefer a canal-based approach as my initial surgical intervention for most eyes undergoing coincident cataract surgery. I believe that it is the safest option that also delivers reliable results. Moreover, ab interno canal surgery does

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not preclude the use of more aggressive procedures in the future. The iStent is synergistic with phacoemulsification as well as up-and-coming sustained-release drug systems, and compelling possibilities will follow when the MIGS devices can be used in pseudophakic and phakic open-angle glaucoma patients.

In the past, medicines and laser trabeculectomy were the traditional initial treatments; after their failure, trabeculectomy and tube shunts followed. Although each of these strategies is still useful, safe new procedures should reduce the number of trabeculectomies needed. I encourage all surgeons who manage patients with glaucoma to learn and implement MIGS procedures. ■

1. Aptel F, Cucherat M, Denis P. Efficacy and tolerability of prostaglandin analogs: a meta-analysis of randomized controlled clinical trials. *J Glaucoma*. 2008;17(8):667-673.
2. Leahy KE, White AJ. Selective laser trabeculectomy: current perspectives. *Clin Ophthalmol*. 2015;9:833-841.
3. Berdahl JP. Cataract surgery to lower intraocular pressure. *Middle East Afr J Ophthalmol*. 2009;16(3):119-122.
4. Fea AM. Phacoemulsification versus phacoemulsification with micro-bypass stent implantation in primary open-angle glaucoma. *J Cataract Refract Surg*. 2010;36:407-412.
5. Fea AM, Pignata G, Bartoli E, et al. Prospective, randomized, double-masked trial of trabecular bypass stent and cataract surgery vs. cataract surgery alone in primary OAG: long-term data. Presented at: The XXX Congress of the European Society of Cataract and Refractive Surgeons; September 10, 2012; Milan, Italy.
6. Fea AM. Results of phacoemulsification compared with phacoemulsification and stent implantation in patients with POAG at 15 months. Abstract presented at: The Annual Meeting of the American Academy of Ophthalmology; November 10, 2008; Atlanta, GA.
7. Voskanyan L, Garcia-Feijoo J, Belda JL, et al. Prospective, unmasked evaluation of the iStent Inject system for open-angle glaucoma: synergy trial. *Adv Ther*. 2014; 31:189-201.

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