

MIGS Integration in Cataract Surgery Improves IOP Control

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Cataract formation remains a leading cause of reversible blindness globally, with surgical extraction being the definitive treatment. Many patients presenting for cataract surgery also have coexisting glaucoma, a progressive optic neuropathy that requires lifelong management of intraocular pressure (IOP).

Historically, managing both conditions simultaneously presented a dilemma: either stage the procedures, increasing patient burden and recovery time, or perform a more invasive combined phaco-trabeculectomy, which carries higher risks. The advent of minimally invasive glaucoma surgery (MIGS) devices has offered a compelling alternative, allowing for concurrent treatment of both conditions with a more favorable safety profile.

KEY TAKEAWAYS

- **The Pivot:** MIGS devices, when combined with cataract surgery, offer a less invasive and safer option for managing coexisting glaucoma than traditional combined procedures.
- **The Data:** Patients undergoing combined MIGS and cataract surgery often achieve a significant reduction in IOP and a decrease in glaucoma medication burden.
- **The Action:** Refer patients with cataracts and mild to moderate glaucoma to surgeons proficient in MIGS techniques to optimize visual and IOP outcomes.

Cataract surgery, or phacoemulsification, is one of the most frequently performed surgical procedures worldwide, restoring vision for millions annually. But for a substantial subset of these patients, the visual impairment from lens opacification is compounded by glaucoma, a condition characterized by progressive damage to the optic nerve, often associated with elevated intraocular pressure. Managing these two distinct pathologies simultaneously has long posed a clinical challenge, balancing the need for visual rehabilitation with the imperative to preserve optic nerve function. Traditional approaches to combined cataract and glaucoma management included either sequential surgeries, which meant multiple procedures and prolonged recovery for the patient, or a combined phaco-trabeculectomy. While effective at lowering IOP, trabeculectomy is a more invasive procedure with a higher risk profile, including hypotony, choroidal effusions, and bleb-related complications. This risk-benefit calculus often led clinicians to defer glaucoma surgery in patients with mild to moderate disease, or to opt for medical management alone, even when surgical intervention might have been beneficial.

The landscape shifted with the introduction of minimally invasive glaucoma surgery (MIGS) devices. These devices are designed to reduce IOP through various mechanisms, including enhancing aqueous outflow through the trabecular

meshwork, Schlemm's canal, or the suprachoroidal space, or by reducing aqueous production. Their defining characteristic is their less invasive nature compared to traditional incisional glaucoma surgeries, allowing for smaller incisions, faster recovery, and a significantly improved safety profile. This makes them particularly attractive for combination with cataract surgery, as the cataract incision can often be leveraged for MIGS device insertion. A key advantage of MIGS procedures is their ability to be performed concurrently with phacoemulsification, typically through the same corneal incision used for cataract extraction. This single-session approach reduces surgical burden, anesthesia exposure, and recovery time for the patient. The primary goal of combining these procedures is to achieve both cataract removal and IOP reduction, or at least stabilization, with a safety profile comparable to cataract surgery alone. This is a critical distinction from more invasive combined procedures, where the glaucoma component significantly increases surgical risk.

The mechanisms of action for various MIGS devices differ, but they generally aim to restore or augment the natural aqueous outflow pathways. For example, trabecular meshwork bypass stents, such as the iStent (Glaukos) or Hydrus Microstent (Ivantis), create a direct conduit from the anterior chamber to Schlemm's canal, bypassing the primary site of outflow resistance in open-angle glaucoma. Other devices, like the Xen Gel Stent (Allergan), create a subconjunctival outflow pathway, similar to a trabeculectomy but with a smaller, less invasive implant. Canaloplasty procedures, sometimes performed with devices like the ABiC (Ellex), aim to dilate Schlemm's canal and the collector channels, improving physiological outflow. The choice of MIGS device often depends on the specific type and severity of glaucoma, as well as the surgeon's preference and experience.

Patient selection is paramount for successful combined MIGS and cataract surgery. These procedures are generally indicated for patients with mild to moderate open-angle glaucoma who are undergoing cataract extraction and require either a reduction in IOP or a decrease in their glaucoma medication burden. Patients with advanced glaucoma, angle-closure glaucoma, or secondary glaucomas may require more aggressive, traditional glaucoma surgeries. The decision to proceed with a combined procedure should involve a thorough discussion of the patient's glaucoma severity, target IOP, and overall ocular health. The surgeon must also assess the patient's ability to comply with postoperative care, including topical medications.

The numbers on combined procedures

Clinical data consistently demonstrate that combining MIGS with cataract surgery effectively reduces intraocular pressure and the need for glaucoma medications. For instance, studies on trabecular bypass stents have shown significant IOP reductions. In one meta-analysis of multiple trials involving the iStent, patients undergoing combined phacoemulsification and iStent implantation achieved a mean IOP reduction of 3.5 to 5.0 mmHg from baseline, with a substantial proportion of patients (often over 60%) achieving target IOP without glaucoma medications at 12 months post-surgery. This compares favorably to cataract surgery alone, which typically provides a transient and modest IOP reduction of 1-2 mmHg.

The Hydrus Microstent has also demonstrated robust efficacy. A pivotal trial, comparing combined Hydrus implantation with cataract surgery versus cataract surgery alone, showed that at 24 months, 77% of Hydrus patients achieved a 20% or greater reduction in unmedicated diurnal IOP, compared to 57% in the cataract-only group ($P < .001$). Furthermore, 53% of Hydrus patients were medication-free, versus 30% in the control group ($P < .001$). These numbers underscore the sustained benefit of these devices in reducing both IOP and medication dependence.

Safety profiles for these combined procedures are generally excellent, mirroring those of cataract surgery alone. Common adverse events are typically mild and transient, including transient hyphema, stent malposition, or mild inflammation. These are usually self-limiting and resolve without long-term sequelae. The risk of serious complications, such as endophthalmitis or permanent vision loss, remains exceedingly low, comparable to that of uncomplicated cataract surgery. This favorable safety profile is a major driver for the increased adoption of MIGS in appropriate patients. Still, not all MIGS devices are created equal, nor are they suitable for every patient. The Xen Gel Stent, for example, creates a subconjunctival bleb, similar to a trabeculectomy, and is typically reserved for patients with more advanced glaucoma or those who have failed other MIGS procedures. While effective at lowering IOP, it carries a higher risk of bleb-related complications, such as hypotony or bleb encapsulation, compared to Schlemm's canal-based devices. Surgeons must carefully weigh the potential benefits against these increased risks when selecting the appropriate device. The long-term durability of MIGS devices remains an area of ongoing investigation. While 2-year and 3-year data are available for some devices, longer-term outcomes beyond five years are still emerging. This is a critical consideration for patients with a long life expectancy, as glaucoma is a chronic, progressive disease. The potential need for future interventions, either additional MIGS procedures or traditional glaucoma surgery, should be part of the preoperative discussion. But the initial success in reducing IOP and medication burden often delays the need for more invasive procedures, preserving patient quality of life.

The open-label design of many early MIGS trials is an obvious caveat. While blinding is challenging in surgical trials, the lack of it can introduce bias. But the objective nature of IOP measurement and medication counts helps mitigate some of this concern. The trials were also not powered to detect differences in rare complications, and that gap matters for comprehensive risk assessment. But the cumulative experience from real-world registries and post-market surveillance continues to reinforce the favorable safety profile observed in clinical trials.

MIGS was tested primarily in patients with mild to moderate open-angle glaucoma. Whether benefits extend to broader groups, such as those with pseudoexfoliation glaucoma or pigmentary glaucoma, remains unclear without specific trials. While the underlying pathophysiology of elevated IOP may differ slightly, the anatomical targets of many MIGS devices are still relevant. But clinicians should exercise caution and rely on established evidence for specific patient populations. The cost-effectiveness of MIGS procedures is another important consideration. While the devices themselves add to the surgical cost, the potential for reduced medication burden and fewer follow-up visits for glaucoma management could offset these initial expenses over time. This economic argument is particularly relevant in healthcare systems where medication costs and long-term follow-up represent significant expenditures. But detailed health economic analyses are still evolving and vary by region and reimbursement policies.

CLINICAL IMPLICATIONS

The integration of MIGS into cataract surgery is not merely an incremental improvement; it represents a fundamental shift in how we manage coexisting glaucoma. For the European GP or specialist, this means a new standard of care for a significant proportion of their cataract patients. No longer is it acceptable to simply remove the cataract and hope for incidental IOP reduction, especially when a safe, effective, and concurrent option exists.

Referral patterns must adapt. Clinicians should actively seek out ophthalmologists proficient in MIGS

techniques, particularly for patients with mild to moderate open-angle glaucoma who are already candidates for cataract extraction. The goal is not just clear vision, but also optimized IOP control and, ideally, a reduction in the lifelong burden of glaucoma medications, which improves adherence and reduces side effects.

The industry has responded with a proliferation of devices, each with its own nuances and indications. This requires surgeons to be well-versed in the various technologies and to select the appropriate device for the individual patient's anatomy and glaucoma severity. For patients, this means a more personalized approach to their combined ocular conditions, often resulting in better overall outcomes and a simpler postoperative regimen.

But the long-term data, particularly beyond five years, still needs to mature for many of these devices.

While current evidence supports their short-to-medium term efficacy and safety, the question of sustained IOP control over decades remains. Future trials must focus on these extended outcomes and comparative effectiveness across different MIGS platforms to truly solidify their place in the glaucoma treatment algorithm.

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