IT TAKES TWO

Combining endoscopic cyclophotocoagulation with microinvasive glaucoma surgery.

BY MARK WELCH, DO

Until the advent of microinvasive glaucoma surgery (MIGS), the options for treating patients with mild to moderate glaucoma were limited to medication and laser therapy. Traditionally, ophthalmologists reserve trabeculectomy and tube shunt surgery for patients with advanced disease because of the rate of complications with these procedures. Surgeons have generally limited transscleral cyclophotocoagulation (TSCPC) and endoscopic cyclophotocoagulation (ECP) to patients with intractable glaucoma and poor visual potential.[1]

The goal of MIGS is to lower the IOP while maintaining the safety profile of standard cataract surgery. Why, then, consider combining ECP with MIGS in patients with mild to moderate glaucoma? Although the available MIGS procedures are much safer than filtration surgery, the former are less efficacious than the latter. The idea behind combining ECP and MIGS is to maintain a high safety profile while approaching the efficacy of trabeculectomy or tube shunt surgery by treating both the inflow and outflow aqueous pathways.[2]

HISTORY OF ECP AND TSCPC

Since it was originally recognized as a possible method to treat glaucoma, cyclodestruction of the ciliary body has taken many forms such as cryotherapy, ultrasound, and laser light.[1,3] Currently, ophthalmologists employ an 810-nm-wavelength diode laser to achieve cyclodestruction of the ciliary epithelium through either a TSCPC or an ECP approach.

Although TSCPC is more portable and less invasive than ECP, it has a number of downsides, including a lack of visualization of the ciliary processes and extensive collateral damage to other structures. The result can be overtreatment and inflammation, leading to significant complications such as hypotony, phthisis bulbi, iridocyclitis, cystoid macular edema (CME), hyphema, fibrin deposition, and retinal detachment. TSCPC with a low and slow burn technique minimizes these risks.[4]

ECP, developed in 1992, further reduces the risks by creating very little collateral damage and by enabling ophthalmologists to titrate the treatment endpoint with direct visualization of the ciliary processes. Multiple studies have confirmed that there is less tissue disruption with ECP than with TSCPC.[5,6] Additionally, ECP provides more flexibility on how much of the ciliary processes to treat: the typical 270°, a full 360° in some cases, or in some very advanced cases, ECP plus (which includes treating part of the pars plana; see *Watch It Now* on p. 71). Although ECP is not risk free, the procedure causes less inflammation and fewer postoperative complications than TSCPC. For these reasons, ECP has been used as an adjunct to a MIGS procedure to further enhance IOP lowering in some patients.

ENDOSCOPIC CYCLOPHOTOCOAGULATION

Technique

The delivery of ECP is achieved by a laser console and sterile endoscope, which can be inserted through a limbal or pars plana approach (determined by lens and vitreous status; E2 Microprobe Laser and Endoscopy System [BVI]). The endoscope components provide illumination, a camera, an aiming beam, and laser delivery. Surgeons observe the procedure on the console monitor.

The desired tissue effect is to shrink and whiten the ciliary process and to treat the whole ciliary process without causing tissue to explode (which can lead to inflammation). The ophthalmologist modulates treatment by adjusting the power of the laser delivery (0.1-0.2 W to start) or the distance of the probe from the ciliary processes (starting at a distance of 2 mm with six processes in view). He or she treats at least 270°. If a tissue explosion is seen, the surgeon

AT A GLANCE

- The idea behind combining endoscopic cyclophotocoagulation (ECP) and microinvasive glaucoma surgery is to maintain a high safety profile while approaching the efficacy of trabeculectomy or tube shunt surgery by treating both the inflow and outflow aqueous pathways.
- ECP can treat a wide variety of glaucomas, but it is not for every patient. Nor is the procedure without risk. Physicians must take this into consideration, especially when performing ECP on patients with mild to moderate glaucoma, because they expect good vision after phacoemulsification and microinvasive glaucoma surgery.

WATCH IT NOW

For another perspective on ECP, ECP plus, and advances in laser cyclophotocoagulation, watch this episode of Glaucoma Today Journal Club featuring Robert Noecker, MD, MBA.

increases probe distance or decreases power. It is also important not to damage the endothelium or the iris with the laser or the probe. (See *Watch It Now* on p. 72 for a video from Won Kim, MD.)

Inflammation Prophylaxis

A subconjunctival steroid alone may not be enough. My own protocol is to use intracamaral dexamethasone (4 mg/mL) with a dose of 0.1 to 0.2 mL (anterior chamber or pars plana) and perioperative systemic dexamethasone 2 to 8 mg administered intravenously.

ECP COMBINED WITH MIGS

Possible Pairings

Possible combinations with ECP are a trabecular microbypass stent, ab interno canaloplasty, ab interno trabeculectomy, ab interno trabeculotomy, or a supraciliary stent. My surgical order is determined by the combination. Usually, I perform MIGS first, followed by cataract removal. I proceed with ECP after cataract removal for best visualization of the ciliary processes. When I combine ECP with the iStent Trabecular Micro-Bypass Stent (Glaukos), however, the order is phacoemulsification, ECP, and then the MIGS device so that the iris does not dislodge the implant during ECP.

Indications and Contraindications

ECP is a viable option for patients who do not require a trabeculectomy or tube shunt but for whom cataract removal and MIGS might not be enough to achieve the target IOP. I also consider combining MIGS and ECP in patients who are intolerant of their medication regimen and would benefit from a decrease in their number of drops.

ECP can treat primary open-angle glaucoma, chronic angle-closure glaucoma, glaucoma after penetrating keratoplasty (consultation with a cornea colleague needed first), congenital glaucoma, neovascular glaucoma (retina consultation may be warranted), and refractory glaucoma (failure of multiple prior surgeries). That said, ECP is not for every patient. Relative contraindications include a history of CME, active uveitis, diabetic macular edema, uveitic glaucoma, and a functioning trabeculectomy.

Postoperative Care

Postoperative care for most MIGS procedures is the same as for cataract surgery alone, which includes a topical antibiotic, a steroid, and a nonsteroidal anti-inflammatory drug (in diabetic patients). When adding ECP, I also consider 1 to 2 days of oral acetazolamide (Diamox; Wyeth Pharmaceuticals) 500 mg dosed twice daily, an oral steroid burst, and cycloplegia for 1 week. I prefer that patients maintain their glaucoma medication regimen and taper it slowly over 4 to 8 weeks. Theoretically, their IOP should drop immediately, but in my experience, it takes about a month to reach the lowest IOP.

Potential Complications

Although ECP is a much more targeted therapy than TSCPC, it can still be associated with an IOP spike (14%), inflammation, anterior chamber fibrin, hyphema (4%), CME (1%-10%), vision loss (1%-6%), and choroidal detachment (< 1%). A large study by Berke and colleagues, however, found equal rates of CME between phacoemulsification combined with ECP and phacoemulsification alone and no serious complications in either group.[7] Serious complications such as hypotony,[8,9] malignant glaucoma,[10] and phthisis[11] are extremely uncommon with standard ECP compared to TSCPC. There are no reports of sympathetic ophthalmia with ECP.

Physicians must take these factors into account, especially when performing ECP on patients with mild to moderate glaucoma, because they expect good vision after phacoemulsification and MIGS procedures.

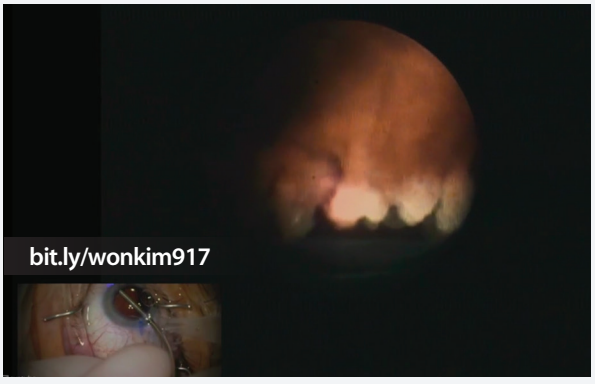
CONCLUSION

ECP can be effective in treating patients with refractory glaucoma, and it may have a role in mild to moderate glaucoma patients who need cataract removal. The procedure offers precise treatment of tissue and rapid recovery compared to TSCPC. Aggressive prophylaxis of inflammation is highly recommended.

Combining ECP and cataract removal with a MIGS procedure may be of benefit when trying to reach a lower target IOP, but doing so is not without some increased risk. There is no high-quality evidence proving that combining MIGS

WATCH IT NOW

Won Kim, MD, demonstrates the ECP surgical technique.



with ECP is better than performing the individual procedures alone, and there are no data comparing this combination with trabeculectomy or tube shunt surgery. Short-term results look promising, however, and the safety profile is excellent compared to more invasive glaucoma surgery. ■

The views expressed in this article are the author's and not those of the US Government.

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