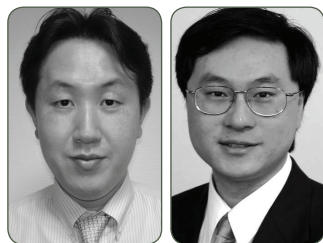


A TARGETED APPROACH

Endocyclophotocoagulation for glaucoma management.

BY CHUNGKWON YOO, MD, PhD, AND SHAN C. LIN, MD



The main mechanisms for lowering IOP are enhancing outflow and decreasing the production of aqueous humor. These two targets are reversibly modulated by topical medication and may be permanently altered by

laser or surgical treatment.

Cyclophotocoagulation (CPC) lowers IOP primarily by destroying ciliary processes and suppressing aqueous production, although it may also increase uveoscleral outflow through the areas of damaged tissue. Transscleral diode laser CPC (TSCPC) has been the mainstay of cyclodestructive procedures. Because the surgeon delivers the laser energy from outside without directly visualizing the ciliary body, the procedure may cause excessive damage to the ciliary processes and adjacent tissues such as the sclera, iris root, and pars plana. TSCPC has been reserved for refractory glaucoma because of the risk for serious complications such as hypotony and phthisis bulbi.

To overcome such shortcomings, modifications in the forms of endoscopic CPC (ECP) and micropulse CPC have emerged.^{1,2} A recent retrospective study on changes in procedural treatments for glaucoma demonstrated that the total number of TSCPC procedures performed in the United States decreased 45% from 5,978 to 3,268 between 2005 and 2012 and that ECP use increased 99% from 5,383 to 10,728 during the same period.³

ENDOSCOPIC CPC

Compared with TSCPC, ECP has several advantages. It is a more targeted procedure that minimizes inadvertent damage to adjacent tissues. Scleral thickness, pressure against the sclera, and the angle of the probe may affect the outcomes of TSCPC.^{4,5} An autopsy study found that only 35% of the emitted laser energy from TSCPC reached the pigmented epithelial cells of the ciliary body.⁶ Thus, a higher-powered laser is likely to be used for TSCPC. Moreover, a “popping” sound is the only indicator of adequate penetrance of the laser energy and is also considered overtreatment for TSCPC. In ECP, conversely, surgeons can visualize an endpoint of shrinkage of the ciliary body (Figure).⁵

ECP can be combined with cataract surgery and other intraocular procedures.⁷ Several investigators have reported

a reduction in IOP and medication burden after combined phacoemulsification and ECP for the treatment of mild to moderate glaucoma.^{8,9} Additionally, ECP can successfully be performed in an eye in which TSCPC has failed to lower IOP.¹⁰ Finally, endocycloplasty can be achieved with ECP in eyes with plateau iris. For endocycloplasty, laser energy is applied at the posterior portion of the ciliary process to cause shrinkage and concurrent posterior retraction.^{11,12}

CAVEATS

A phakic eye is a relative contraindication for ECP. It is also worth noting that ECP is an invasive procedure and may therefore be complicated by postsurgical infection.

Postoperative refractive outcomes may be more variable when the procedure is combined with phacoemulsification. More myopic shifts were reported in eyes with angle closure after the combined procedure.¹³

Chronic hypotony may still be a concern after ECP. Although the procedure is expected to provide a more



AT A GLANCE

- Surgeons have reserved transscleral diode laser cyclophotocoagulation (TSCPC) for cases of refractory glaucoma because of the risk of serious complications such as hypotony and phthisis bulbi. To overcome such shortcomings, endoscopic cyclophotocoagulation (ECP) and micropulse cyclophotocoagulation have emerged as modifications.
- Compared with TSCPC, ECP is a more targeted procedure that can be combined with cataract surgery and other intraocular procedures. ECP can be successfully performed on an eye after TSCPC has failed to lower IOP, and endocycloplasty can be achieved with ECP in eyes with plateau iris.
- Overall, ECP seems to be an effective surgical option for the management of recalcitrant glaucoma when other surgical options have failed or may not be feasible.

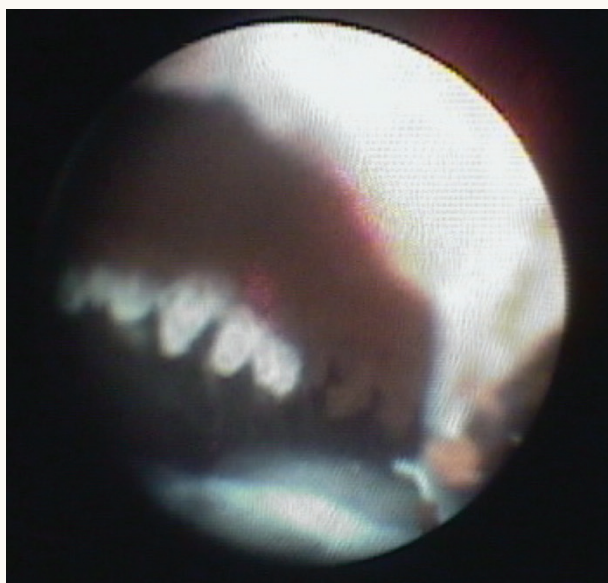


Figure. Endoscopic view of the ciliary processes. Those on the left have been treated and show whitening and shrinkage compared with untreated processes on the right.

guarded ablation of the ciliary body compared with TSCPC, several studies have reported the occurrence of chronic postoperative hypotony. Unfortunately, no risk factors for the development of chronic hypotony have been identified.¹⁴

ECP's outcomes in eyes with exfoliation glaucoma need to be studied further. Given the zonular instability and

the deposits of exfoliative materials, the procedure's safety and efficacy in these eyes may differ from what has been reported for other types of glaucoma.

Finally, postoperative inflammation may be more intense after ECP combined with phacoemulsification than when the former is performed alone. Surgeons must therefore exercise caution when performing the combined procedure on eyes at risk of cystoid macular edema.

CONCLUSION

Overall, ECP seems to be an effective surgical option for the management of recalcitrant glaucoma when other surgical options have failed or may not be feasible. Some recent evidence supports broadening this procedure's indications across different severity levels and types of glaucoma. Randomized controlled trials are warranted to confirm ECP's safety and efficacy as a first-line treatment for glaucoma. ■

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Shan C. Lin, MD

- professor of ophthalmology, Department of Ophthalmology, University of California, San Francisco
- (415) 514-0952; lins@vision.ucsf.edu
- financial disclosure: has been a consultant to and received honoraria from Iridex

Chungkwon Yoo, MD, PhD

- professor of ophthalmology, Department of Ophthalmology, Korea University College of Medicine, Seoul, South Korea
- associate visiting professor of ophthalmology, Department of Ophthalmology, University of California, San Francisco
- +82-2-920-5521; ckyoomd@korea.ac.kr
- financial interest: none acknowledged