ORIGINAL RESEARCH

Success of Endoscopic Laser Cyclophotocoagulation vs Repeat Transscleral Treatment after Prior Transscleral Cycloablation

Christiane Al-Haddad[1], Anita Barikian[2], Zeinab El Moussawi[3], Nour A Nasser[4], Bahaa' Noureddine[5], Ziad Bashshur[6]

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Abstract

Aim: To compare the efficacy of endoscopic cyclophotocoagulation (ECP) vs repeat transscleral cyclophotocoagulation (TCP) in eyes with persistent glaucoma despite prior treatment with TCP.

Materials and methods: This was a retrospective chart review of glaucoma patients at the American University of Beirut Medical Center over 10 years who underwent ECP or repeat TCP. We reported qualified and complete success; success was defined as postoperative intraocular pressure (IOP) ≤21 mm Hg, with (qualified) or without medications (complete) and without procedure-related complications.

Results: This study included 23 eyes of 21 patients with various forms of uncontrolled glaucoma who had failed TCP. A total of 13 eyes of 12 patients underwent ECP with a mean age of 39.9 ± 23.2 years, and 10 eyes of nine patients underwent repeat TCP with a mean age of 27.2 ± 22.6 years. A significant decrease in IOP was observed from 38.5 ± 7.9 mm Hg preoperatively to 25.2 ± 8.8 mm Hg postrepeat TCP ($p = 0.006$) and from 33.0 ± 9.5 to 12.8 ± 3.9 mm Hg post-ECP ($p < 0.001$), noted at a mean follow-up time of 39.2 ± 44.4 and 41.5 ± 37.4 months, respectively. The mean number of antiglaucoma medications decreased in the two groups (from 3.8 ± 1.0 preoperatively to 1.8 ± 0.9 postoperatively for ECP and from 3.5 ± 1.3 to 3.1 ± 0.9 postoperatively for TCP); however, the drop was only statistically significant post-ECP. Qualified success was significantly higher after ECP vs repeat TCP (91.7 vs 40%, respectively). Complete success was achieved only in 1/12 (8.3%) eyes in the ECP group.

Conclusion: Endoscopic cyclophotocoagulation (ECP) performed in glaucomatous eyes previously treated with transscleral cycloablation provided more IOP control as compared to repeat TCP by directly treating viable tissue in previously skipped ciliary processes and in between processes.

Clinical significance: In glaucomatous eyes previously treated with transscleral cycloablation, ECP attained better IOP control than repeat transscleral cycloablation.

Keywords: Endoscopic cyclophotocoagulation, Glaucoma, Transscleral cycloablation, Treatment.

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Introduction

Several surgical interventions are used to treat glaucoma, including angle and filtration surgeries, drainage implant surgery, and cycloablation. Destruction of the ciliary body to control glaucoma was initially described in 1905 when Heine correlated reduced intraocular pressure (IOP) with ciliary body detachment.[1] Cyclodestructive procedures decrease IOP by reducing aqueous humor production through ciliary process ablation. Cyclodestruction can be performed using various techniques such as surgical excision, diathermy, electrolysis, and cryotherapy.[1] In the 1970s, Beckman and Sugar popularized the use of transscleral cyclophotocoagulation (TCP) for the treatment of refractory glaucomas.[2]

Cyclophotocoagulation is traditionally reserved for end-stage glaucoma after multiple procedures have failed for fear of side effects of hypotony, visual loss, and phthisis.[3–6] In 1992, Uram described the microendoscope that allowed direct visualization and treatment of vitreoretinal disease with a diode laser.[7] Endoscopic cyclophotocoagulation (ECP) applies laser energy to the ciliary processes under direct visualization. ECP is gaining popularity as a surgical intervention in aphakic and pseudophakic glaucoma,[8] anterior segment dysgenesis,[9] and concurrently with cataract surgery.[10] ECP has become an important technique for the treatment of refractory glaucomas[11–13] and may have distinct advantages over TCP since it allows direct visualization of the target ciliary processes. Few studies in the literature have reported on the difference between those two interventions in terms of safety and efficacy. Kraus et al. found that the success rate of repeat TCP was 67.6%, which is not significantly different from that of ECP (62%).[14] Similar findings were reported by Lanzagorta-Aresti et al., where ECP was found to be less effective but safer than TCP in decreasing IOP.[15]

This study aimed to compare the outcomes of ECP vs repeat TCP performed in glaucomatous eyes that failed previous transscleral cycloablation.

[1–6]Department of Ophthalmology, American University of Beirut Medical Center, Beirut, Beirut Governorate, Lebanon

Corresponding Author: Ziad Bashshur, Department of Ophthalmology, American University of Beirut Medical Center, Beirut, Beirut Governorate, Lebanon, e-mail: zb00@aub.edu.lb

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Materials and Methods

A retrospective chart review of patients with glaucoma was performed in the Ophthalmology Department at the American University Beirut from May 2011 to August 2020. Patients were included if ECP or TCP was done after prior transscleral treatment had failed to control IOP. Patients with <1 month of follow-up posttreatment were excluded. This study was approved by the Institutional Review Board of the American University of Beirut, and informed consent was waived.

Data collected for analysis included patient demographics, pre- and postoperative IOP, number of glaucoma medications, and visual acuity. Procedure-related data included the arc of treatment, additional intraoperative procedures such as vitrectomy, secondary procedures, postoperative complications, and the length of follow-up. Follow-up was recorded from the time of treatment to the time of failure or until the last visit for the successes. The procedures were performed by three surgeons from a single institution who followed the exact same surgical/laser technique using the same set-up: author BN performed TCP in adults, author ZB performed ECP in adults, and author CA performed ECP and TCP for pediatric patients. In both ECP and TCP groups, one-third of patients had pediatric glaucoma whose procedures were performed by CA.

Endoscopic cyclophotocoagulation (ECP) or repeat TCP was performed when IOP was uncontrolled (>21 mm Hg) on maximal medical treatment. We report complete and qualified success. Qualified success of intervention was defined as postoperative IOP of ≤21 mm Hg, with or without medications (topical or oral) and without procedure-related complications or need for further glaucoma surgery. Complete success was defined as a postoperative IOP of ≤21 mm Hg, without medications and without procedure-related complications or the need for further glaucoma surgery. Hypotony was defined as IOP below 6 mm Hg.

Transscleral cyclophotocoagulation (TCP) was performed using the Iridex laser (IRIS Medical Instruments, Inc., Mountain View, California, United States of America), emitting at 810 nm through a contact probe (G-probe). The majority of the laser procedures—excluding a few pediatric cases that were performed under general anesthesia—were performed as office procedures under regional anesthesia, with the retrobulbar injections consisting of a 50:50 mixture of 2% lignocaine and 0.5% marcaine. The G-probe was placed at the limbus for patients with preserved ocular anatomy, and the application sites were moved posteriorly by 1.5 mm for eyes with congenital and developmental glaucoma and for those with staphylomas. The laser settings consisted of a power ranging from 1500 to 2250 mW and a pulse duration between 2000 and 3000 milliseconds, with 20–40 applications on the first treatment and 20 applications for any subsequent retreatment. The power setting was lowered if "pops" were heard in the early shots. Transillumination of the ciliary processes was used in eyes with limbal anatomic changes and staphylomas. The 360° treatment was used in both the primary and retreatment sessions. The 3 and 9 o'clock positions were always spared to avoid the long ciliary nerves.

Endoscopic cyclophotocoagulation (ECP) was performed under local or general anesthesia under the operating microscope. The microendoscope (Endo Optiks Inc., Little Silver, New Jersey, United States of America), which is connected to a video monitor and integrates an 810 nm diode laser, was used to perform ECP. A 20-gauge MVR blade was used to enter the posterior surgical limbus, usually nasally and temporally. Viscoelastic was injected in the ciliary sulcus area to facilitate access to the ciliary processes. Generally, normal-appearing ciliary processes were targeted. Previously treated areas with remnants of normal unscarred viable tissue were also treated. Using a power setting between 400 and 600 mW on continuous mode, the entire ciliary process, as well as the adjacent inter-processes areas, was blanched, avoiding tissue bleeding or disruption. The total arc of treatment ranged between 90 and 360° according to the extent of untreated and partially treated ciliary processes. Using mild aspiration and irrigation, viscoelastic material was washed out from the anterior segment. The paracentesis sites were closed with 10-0 nylon sutures if needed. Subconjunctival injections of antibiotics and dexamethasone were given in the inferior fornix. The eye was dressed with an antibiotic/steroid ointment. In case a concomitant pars plana vitrectomy was performed, the ciliary processes were approached through the nasal or temporal pars plana 20-gauge sclerotomies. The laser settings and treatment plan were otherwise identical to the limbal approach.

Data are presented as mean ± standard deviation (SD) for normally distributed variables and as median with range for nonnormally distributed variables. The student's *t*-test was used to compare pre- and postoperative parameters (number of medications and IOP). Statistical significance was set at $p < 0.05$.

Results

This study included 23 eyes of 21 patients with uncontrolled glaucoma who had failed TCP. A total of 13 eyes of 12 patients underwent ECP following TCP: four female and eight male patients. The mean age was 36.4 ± 21.7 years at the time of treatment, with three subjects (25%) younger than 18 years. The mean number of prior ocular surgeries (including glaucoma surgeries) was 1.6 ± 1.0, and the median number of prior transscleral treatments was one (one to three), with one patient (one eye) having TCP done twice, and one patient (two eyes) having TCP three times. Two patients had undergone prior trabeculectomy surgery, and two others had tube shunt placement. Two eyes had corneal transplantation prior to treatment. A concomitant procedure at the time of ECP was performed in six eyes: phacoemulsification (two), lensectomy (one), pars plana vitrectomy (two), and pars plana vitrectomy with lensectomy (one). The median time elapsed between the TCP treatment and ECP was 25.4 (2–107) months.

In the repeat TCP group, 10 eyes of nine patients were included: five females and four males. The mean age at the time of the first TCP was 27.2 ± 22.6 years, with four (45%) subjects younger than 18 years. The subjects underwent an average of 0.9 ± 0.8 prior ophthalmic surgeries, including trabeculotomy and tube shunt placement. All eyes underwent TCP once prior to the final TCP, with a median time of 19 (1–156) months between the two treatments. Patient preoperative characteristics are stated in Table 1.

Baseline visual acuity was, in general, poor in the two groups (Table 2). For the ECP group, visual acuity was unchanged after treatment in eight eyes but improved in two eyes from hand motion to 20/100 and from fix to follow to counting fingers at 2 m. Vision deteriorated in three eyes: from hand motion to light perception in one eye and from counting fingers at 0.5 m to counting fingers near the face in two eyes. For the TCP group, the visual acuity of five eyes did not change; four eyes had enhanced visual acuity (from 20/100 to 20/50, from 20/50 to 20/30, from counting fingers (CF) 30 cm to CF 0.5 m, and from CF 30 cm to 20/50), and one eye had worsened acuity, from 20/60 to 20/200.

Table 1: Patient baseline characteristics

	TCP/TCP N = 10 eyes	*ECP/TCP N = 13 eyes*	*p-value*
Mean age at treatment ± SD (years)	27.2 ± 22.6	36.4 ± 21.7	0.2
Male gender (*n*) (%)	4 (45%)	8 (67%)	0.3
Laterality (*n*) (%)			
OD	5 (50%)	5 (38.5%)	0.6
OS	5 (50%)	8 (61.5%)	0.6
Glaucoma diagnosis (*n*) (%)			
Congenital	4 (40%)	4 (30.8%)	
Chronic angle closure	–	2 (15.4%)	
Primary open-angle	2 (20%)	2 (15.4%)	
Juvenile	–	1 (7.7%)	
Secondary glaucoma	4 (40%)	4 (30.8%)	
The mean number of previous ocular surgeries ± SD	0.9 ± 0.8	1.6 ± 1.0	**0.04**
The mean number of previous glaucoma surgeries ± SD	0.5 ± 0.4	0.4 ± 0.3	0.6

ECP, endoscopic cyclophotocoagulation; OD, right eye; OS, left eye; SD, standard deviation; TCP, transscleral cyclophotocoagulation; Bold value indicates statistically significant value

Table 2: Characteristics of eyes before and after treatment

	TCP/TCP N = 10 eyes	*ECP/TCP N = 13 eyes*	*p-value*
The mean number of glaucoma medications ± SD			
Initial	3.5 ± 1.3	3.8 ± 1.0	0.6
Final	3.1 ± 0.9	1.8 ± 0.9	**0.01**
p-value	0.2	**<0.001**	
Mean IOP ± SD (mm Hg)			
Initial	38.5 ± 7.9	33.0 ± 9.5	0.3
Final	25.2 ± 8.8	12.8 ± 3.9	**0.001**
p-value	**0.006**	**<0.001**	
Initial visual acuity (*n*) (%)			
LP	1 (10)	3 (23)	
HM	–	5 (38.5)	
Fix + follow (preverbal)	2 (20)	1 (7.7)	
Counting fingers	4 (40)	2 (15.4)	
<20/50	2 (20)	1 (7.7)	
≥20/50	1 (10)	1 (7.7)	
Final visual acuity (*n*) (%)			
LP	1 (10)	4 (30.7)	
HM	–	3 (23)	
Fix + follow (preverbal)	2 (20)	–	
Counting fingers	3 (30)	3 (23)	
<20/50	1 (10)	2 (15.4)	
≥20/50	3 (30)	1 (7.7)	
Mean time between treatments ± SD (months)	44.6 ± 53.8	37.7 ± 30.8	0.8
Mean follow-up time ± SD (months)	39.2 ± 44.4	41.5 ± 37.4	0.9
Success rate (IOP of ≤21 mm Hg) (*n*) (%)	4 (40)	13 (100)	0.003

ECP, endoscopic cyclophotocoagulation; HM, hand motion; IOP, intraocular pressure; LP, light perception; SD, standard deviation; TCP, transscleral cyclophotocoagulation; initial refers to the ocular examination on the preoperative visit; the final refers to the ocular examination on the last follow-up visit; success rate refers to the qualified success rate, defined as postoperative IOP of ≤21 mm Hg, with or without medications (topical or oral) and without procedure-related complications or need for further glaucoma surgery; Bold values indicate statistically significant values

The mean arc of treatment of ECP was 273 ± 90°; five eyes received 360° treatments. The number of antiglaucoma medications decreased significantly from a mean of 3.8 ± 1.0 preoperatively to a mean of 1.8 ± 0.9 postoperatively ($p < 0.001$). IOP decreased by 60% from a preoperative mean of 33.0 ± 9.5 mm Hg to a postoperative mean of 12.8 ± 3.9 mm Hg, with an absolute reduction of 20 mm Hg over a mean follow-up of 41.5 ± 37.4 months. All eyes had adequate IOP control at the last follow-up, with a consistent drop in IOP observed in the 1st week, persisting for the length of follow-up. No complications were encountered in the postoperative period, and no cases of hypotony were seen.

The group of repeat TCP underwent cyclophotocoagulation with a median power of the laser beam of 2000 mW (1350–2250 mW) for a median total duration of 2000 milliseconds

(2000–4000 milliseconds). The median number of shots applied was 26 (20–40) shots. The number of antiglaucoma medications decreased from a mean of 3.5 ± 1.3 preoperatively to a mean of 3.1 ± 0.9 postoperatively ($p = 0.17$). IOP decreased by 35% from a preoperative mean of 38.5 ± 7.9 mm Hg to a postoperative mean of 25.2 ± 8.8 mm Hg, with an absolute reduction of 13.3 mmHg over a mean follow-up of 39.2 ± 44.4 months. On the last follow-up visit, six eyes had uncontrolled IOP, that is, ≥21 mm Hg, with a range of IOP of 22–38 mm Hg. Also, no complications were reported in the subsequent follow-up visits.

Change in IOP during the postoperative period is shown in both Table 3 and Figure 1, with the number of participants (*n*) being reported at each follow-up period. A significant IOP decrease in eyes with poorly controlled glaucoma despite maximal medical treatment and prior transscleral cycloablation was seen with the two treatments, ECP and repeat TCP. This was seen as a significant drop in IOP from 38.5 ± 7.9 mm Hg preoperatively to 25.2 ± 8.8 mm Hg postrepeat TCP ($p = 0.006$) and a drop from 33.0 ± 9.5 to 12.8 ± 3.9 mm Hg post-ECP ($p < 0.001$). This positive effect was noted shortly after the procedures and lasted for the length of follow-up in the ECP group but not in the repeat TCP group. The qualified success rate was significantly lower after repeat TCP (40%) as compared to the ECP group (100%), $p = 0.03$, at a mean follow-up time of 39.2 ± 44.4 and 41.5 ± 37.4 months, respectively.

Complete success was achieved only in one patient in the ECP group at 8.3% (1/12) and no patients in the TCP group.

Comparing the two interventions, the outcomes of ECP were significantly better than those of repeat TCP; the final IOP and number of prescribed drops recorded in the last follow-up visit post-ECP were significantly lower than those recorded post-TCP ($p = 0.01$ and 0.001, respectively). In addition, the qualified success rate was significantly lower after repeat TCP (40%) as compared to the ECP group (91.7%), with a *p*-value of 0.003. In both groups, the mean follow-up period, and the time between the two interventions were statistically similar ($p = 0.9$ and 0.8, respectively).

Analysis was repeated in the pediatric population (eight eyes) and the adult population (15 eyes) separately; it showed the same results for adults as for the whole population: the final mean number of glaucoma medications was significantly lower for the ECP group ($p = 0.003$), as well as the final mean IOP ($p = 0.027$). The success rate was significantly higher in the ECP than in the TCP group ($p < 0.001$). In the pediatric population, results only tended to be similar to adults: the number of antiglaucoma medications and IOP value were lower postoperatively for the ECP group than the TCP group, albeit not statistically significant ($p = 0.18$ and $p = 0.09$, respectively).

Discussion

In this retrospective study, it was possible to compare the efficacy of IOP control in eyes with poorly controlled glaucoma despite maximal medical treatment and prior transscleral cycloablation between two cyclophotocoagulation+ modalities: TCP and ECP. ECP was found to be more effective than repeat TCP in treating refractory glaucoma. This was noted by a 61.2% drop in IOP post-ECP as compared to only a 34.5% drop after TCP. This positive effect was noted shortly after the procedures; however, it lasted for the length of follow-up only post-ECP. As for the number of antiglaucoma medications used, a significant decrease was seen only post-ECP; this decrease was not significant in the repeat TCP group.

Table 3: Intraocular pressure (IOP) (mean ± SD) during the postoperative period in mm Hg

		Postoperative			
	Preoperative	*1 year*	*2 years*	*3 years*	*Last visit*
TCP/TCP *n* = 10	38.5 ± 7.9 *n* = 10	21.2 ± 6.4 *n* = 7	21.1 ± 0.9 *n* = 5	19.2 ± 5.0 *n* = 3	25.2 ± 8.8 *n* = 10
ECP/TCP *n* = 13	33 ± 9.5 *n* = 13	15 ± 7.6 *n* = 8	14 ± 4.2 *n* = 5	11.7 ± 3.7 *n* = 5	12.8 ± 3.9 *n* = 13
p-value	0.3	0.1	<0.001	0.01	0.001

ECP, endoscopic cyclophotocoagulation; SD, standard deviation; TCP, transscleral cyclophotocoagulation

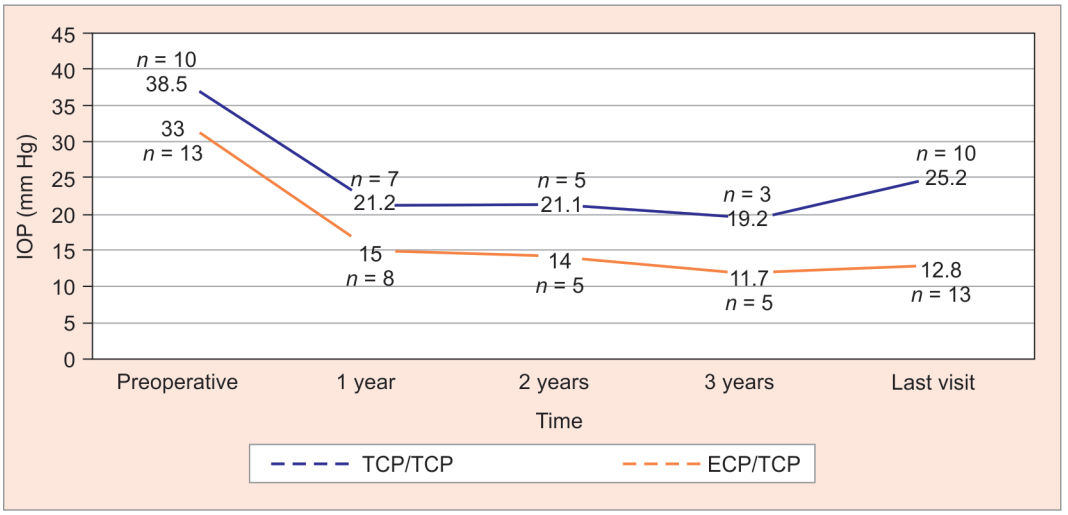

Fig. 1: Graph showing the change in the mean IOP over the follow-up period

The qualified success rate was significantly lower after repeat TCP (40%) than the ECP group (91.7%). Complete success was achieved only in one patient in the ECP group at 8.3% (1/12) and no patients in the TCP group. However, both interventions were safe, with no complications reported. When divided into pediatric and adult groups, the results for adults were the same as for the whole population. However, the differences in the final number of antiglaucoma medications and the final mean IOP did not reach statistical significance between ECP and TCP groups in the pediatric population. This could be attributed to the small sample size (only eight eyes).

Rodrigues et al. showed that ECP successfully controlled IOP in challenging cases of complex secondary glaucoma like scleromalacia, where traditional incisional surgery was contraindicated.[16] Scarce literature exists on a direct comparison between TCP and ECP. Two retrospective reviews studied the efficacy of those interventions head-to-head. Kraus et al. looked at 72 eyes postrepeat TCP and 52 eyes post-ECP. Success was defined as a drop in IOP lower than 21 mm Hg, and it was encountered in 67.6% of the eyes following TCP, as compared to 62% of the eyes post ECP with no statistically significant difference.[14] Reduction in IOP of 28.6 and 33.2% with TCP and ECP, respectively, was observed without statistically significant differences.[14] Similar findings were reported by Lanzagorta-Aresti et al., where repeat TCP was performed for 32 eyes, and ECP was performed for 30 other eyes.[15] The authors commented that both interventions were effective in decreasing IOP, with TCP being more successful in longer maintenance of this IOP control. However, more complications were encountered after TCP compared to ECP, including fibrin exudate, cystoid macular edema, vision loss, and choroidal detachment.[15] Although there are reports of ECP following various IOP lowering procedures, this study focuses specifically on cases that have received and failed prior transscleral cycloablation and compared its outcome to the cases that received repeat transscleral cycloablation. Therefore, it allowed us some insights as to the reasons for transscleral treatment failures and why ECP was able to achieve better IOP control. During the procedure, the endoscopic view of the ciliary processes showed several response patterns to the previous transscleral cycloablation. The most common was the atrophic appearance of the ciliary processes; this manifested as a grayish discoloration of the processes and reduced size relative to untreated areas. Invariably, they contained remnants of normal-appearing unscarred tissue. It may be that these processes were not functioning; however, viable ciliary epithelial cells could still have been secreting aqueous humor. Because the previous ablation was applied transscleral, the heat from the laser or the cryotherapy probe may not have been transmitted sufficiently to destroy aqueous humor-secreting epithelial cells in the ciliary processes. Therefore, retreating these already "treated" areas could further lower aqueous production. The second pattern was that of normal ciliary processes that seemed to have been spared any damage by the transscleral treatment. The final pattern was evidence of treatments outside the ciliary processes (Fig. 2). This appeared as circular greyish areas of atrophy along the pars plana and probably represented burns that missed the ciliary body completely. It could be related to anatomical variations in some eyes whereby the position of the ciliary processes may not be at the expected distance from the limbus. One such example is congenital glaucoma, where eyes are larger than usual, and the ciliary body anatomy may be deformed. In both patterns, missed ciliary processes continue to produce aqueous fluids, and treating them individually under direct vision completes ciliary body ablation. Barkana et al. reported successful IOP control with ECP in a child with persistently elevated IOP after three failed TCP treatments.[17] Under direct visualization, the authors demonstrated many misplaced TCP laser burns in the pars plana away from the ciliary processes. In addition, viable ciliary processes on top of well-placed laser burns were observed.[17]

Interestingly, we did not encounter any ocular hypotony after ECP despite treating over 300° of the ciliary body; in fact, six eyes received 360° of treatment. Similarly, the literature reports low rates of hypotony associated with ECP.[12,18,19] One reason could be that treatment was individually directed at the ciliary processes without using unnecessarily high energy, leading to significant collateral damage. This reduced energy also explains the relatively minor inflammation noted after ECP compared to TCP. Complication rates of inflammation, visual loss, and phthisis are comparatively higher with TCP.[3–6] Nevertheless, an extensive ECP treatment of eyes with neovascular glaucoma may be at a higher risk for hypotony, perhaps due to the ischemic nature of these eyes.[18] Histologic studies revealed that there were fewer architectural changes associated with ECP than TCP.[20,21] A study of rabbit eyes suggested that chronic poor perfusion of the ciliary body after TCP might justify its efficacy and account for complications such as hypotony and phthisis. On the other hand, eyes that underwent ECP showed late reperfusion and, therefore, less chronic poor perfusion.[22] Additionally, no hypotony, endophthalmitis, or choroidal detachment was encountered postrepeat TCP. One must keep in mind that ECP is a more invasive procedure that carries with it the inherent risk of any intraocular surgery, such as endophthalmitis, choroidal hemorrhage, and retinal detachment.[13] However, complications such as hypotony, phthisis, choroidal hemorrhage, or decreased vision were only associated with neovascular glaucoma.[12,19]

Moreover, ECP may pose fewer complications compared to more invasive IOP lowering procedures such as tube shunts.[23] The rates of complications associated with ECP in 5,824 eyes reported by The ECP Collaborative Study Group were relatively low: postoperative IOP spikes (14.5%), vitreous hemorrhage (3.8%), serous choroidal effusion (0.36%), intraocular lens displacement (0.36%), visual loss more than two lines (1.03%), retinal detachment (0.27%), choroidal hemorrhage (0.09%), hypotony or phthisis (0.12%), cataract progression (24.5%), and acute graft rejection (5.3%,). Chronic graft failure, chronic

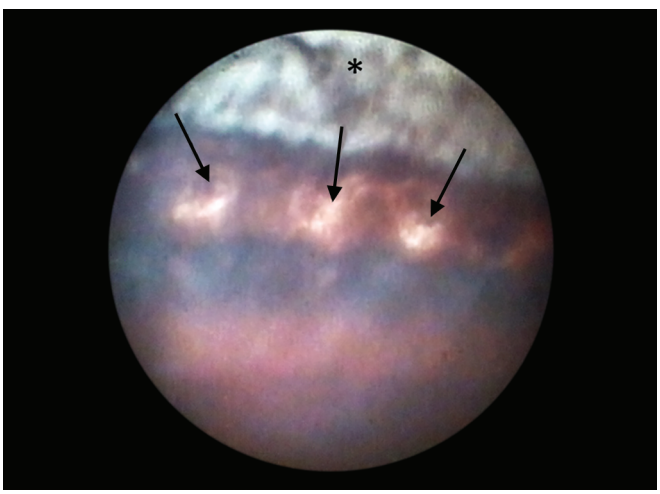

Fig. 2: Endoscopic view of the ciliary body showing three misplaced scars from prior transscleral cycloablation (arrows); the white area above the scars (asterisk) represents the ciliary processes that were treated with ECP; this patient had a preoperative pressure of 54 mm Hg, which dropped to 14 mm Hg 1 week, postoperatively

inflammation, and endophthalmitis were not observed. The incidence of serious complications was very low and occurred primarily in the neovascular and refractory glaucoma groups.[19,24] ECP might also have advantages over TCP in refractory glaucoma cases with relatively good vision as the rate of vision-threatening complications is lower.[19,25–27] Complications post TCP include uveitis, pigment dispersion, hyphema, and lens subluxation, with the most commonly encountered being hypotony (25%) and phthisis (9.9%).[28] In our series, visual acuity was poor in most eyes (LP to counting fingers), and both interventions helped to control IOP while avoiding more complicated and risky intraocular surgeries. Limitations of our study include its retrospective nature and the small sample size, in addition to the heterogeneity of the groups being compared. A number of eyes underwent concomitant surgeries along with the ECP, which may serve as a confounding factor to our results. Finally, the glaucoma diagnoses were heterogeneous, including congenital, primary open-angle, and secondary glaucoma.

Conclusion

In conclusion, ECP performed in glaucomatous eyes previously treated with transscleral cycloablation provided more IOP control than repeat TCP. The success of ECP was higher than repeat TCP in significantly lowering IOP, which was maintained throughout the follow-up period. It also helped lower the number of antiglaucoma medications used. There are no prospective comparative trials favoring ECP over transscleral procedures. However, the success of cycloablative therapy may be affected by variable pigmentation or atypical ciliary body anatomy.[13] Therefore, direct visualization of the ciliary processes allows a targeted approach with a lower incidence of serious complications.

Clinical Significance

In glaucomatous eyes previously treated with transscleral cycloablation, ECP attained better IOP control than repeat transscleral cycloablation.

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