Long-term Visual Outcome of Transscleral Laser Cyclotherapy in Eyes with Ambulatory Vision

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Objective: To determine the long-term visual acuity (VA) outcome of eyes with ambulatory vision (20/80 or better) that were treated with transscleral laser cyclotherapy.

Design: Observational case series.

Participants: Twenty-one eyes of 21 patients who had been treated with laser cyclotherapy and who had been followed up at least 1 year.

Methods: A retrospective chart review was conducted to record the prelaser best-corrected VA and then the last available post laser VA and duration of follow-up. Additional laser or surgical interventions for glaucoma control were also recorded.

Main Outcome Measures: Changes in VA from pretreatment to last available examination.

Results: The 21 eyes were followed for a mean of 40.7 months (range, 13–88 months); 17 eyes had a final vision within 1 line of the prelaser VA. One eye improved 3 lines, and 3 eyes deteriorated 3 or more lines.

Conclusions: Most eyes with 20/80 or better VA maintained close to that acuity after laser cyclotherapy after a mean follow-up of 40.7 months. These good visual results offer support for those who believe that the indications for laser cyclotherapy should not be limited to eyes with poor VA or potential.

Laser cyclotherapy has been receiving increasing attention as a surgical alternative for the treatment of medically uncontrolled glaucoma.1–3 A recent policy statement from the American Academy of Ophthalmology4 addressed the modality and recommended its use in “advanced glaucoma with minimal visual potential.” Our experience with this modality has suggested to us that the indications for its use may be somewhat broader than what is recommended by this policy statement. We have found that in many cases laser cyclotherapy can be used in eyes with 20/80 vision or better with long-term preservation of vision.

Materials and Methods

A request for a retrospective review of patient charts was reviewed and approved by the University of Illinois at Chicago Institutional Review Board. The Minor Surgery logbook at the University of Illinois Eye and Ear Infirmary was reviewed to identify patients who had laser cyclotherapy performed for glaucoma. The charts of these patients were then reviewed to identify patients whose best-corrected visual acuities were 20/80 or better at the time of their initial laser cyclotherapy and who had been followed up for at least 1 year. All the eyes that met those criteria were then further reviewed to determine the age, gender, and race of the patient; the glaucoma diagnosis; and the pretreatment intraocular pressure (IOP), visual acuity (VA), and what previous ocular surgery had been performed. The VA and IOP were then recorded for visits as close to yearly intervals as possible, as well as the last visit available on the patient. Any additional surgical glaucoma treatment since the laser cyclotherapy was also recorded.

Transscleral laser cyclotherapy was performed with 1 of 2 modalities. In 7 patients, contact neodymium:yttrium–aluminum–garnet (YAG) laser cyclotherapy was performed with a continuous-wave neodymium:YAG laser (Surgical Laser Technologies, Oaks, PA) (1064vm) with a fiberoptic delivery system with an artificial sapphire tip that was placed on the conjunctiva approximately 1 mm behind the limbus. The laser was set at 8 W for 0.7 seconds. A total of 32 laser applications was scattered around the 360° of the limbus, avoiding the 3 and 9 o’clock meridians. The other 14 patients were treated with a diode laser (IRIS Medical OcuLight SLx, IRIDEX Corp., Mountain View, CA), with the G-probe delivery system. The laser was set at approximately 2000 mW for 2 seconds. The laser treatment was performed on an outpatient basis. Anesthesia was obtained by topical instillation of tetracaine and a retrobulbar injection of lidocaine 2%. After completion of the cyclodestructive procedure, dexamethasone solution was injected subconjunctivally and neomycin/polymyxin/dexamethasone oint-
ment (Maxitrol, Alcon Pharmaceuticals, Fort Worth, TX) was instilled in the eye. A patch dressing was applied. The IOP was measured after 1 hour. The patient was instructed to leave the patch on until bedtime. The patient was instructed to begin using topical prednisolone acetate the next morning. This was tapered over several weeks as the inflammation subsided. No cycloplegics were administered, and glaucoma medication was continued unchanged until the 1 week posttreatment visit.

Results

Twenty-one eyes of 21 patients were found that met the study eligibility criteria. Almost all of the patients who had laser cyclotherapy during this period who failed to meet the eligibility criteria were not eligible, because their best-corrected pretreatment VA was <20/80. Only a few patients were disqualified because of <1 year of follow-up. The demographics, diagnosis, and treatment history of these patients are listed in Table 1. The baseline year of follow-up. The demographics, diagnosis, and treatment history of these patients are listed in Table 1. The baseline findings of these eyes, as well as the posttreatment clinical information, are listed in Table 2. It will be noticed that most of these eyes were either aphakic or pseudophakic, and most of them had had previous glaucoma filtering surgery. The visual acuities ranged from 20/20 to 20/80. The follow-up period ranged from 13 to 88 months with the mean follow-up of 40.7 months. The vision remained within 1 line of the pretreatment VA in 17 of the 21 patients. One patient had an improvement in VA of 3 lines, whereas 3 eyes had a decrease in VA of 3 lines or greater. In 2 of these 3 eyes with the decrease in vision, the vision dropped to 20/200, and in the third eye it dropped to counting fingers. The patient with the counting fingers vision had bullous keratopathy that obviously was contributing to this decrease in acuity.

The initial laser treatment was insufficient to control the IOP in most of these eyes. Seventeen of the 21 patients required additional laser and/or surgical treatment to further lower the IOP. Sixteen of the 17 had at least 1 additional laser treatment, whereas 6 of them had 2 or more laser treatments. In 2 patients, Baerveldt shunts were placed in the eyes, 1 after an additional laser treatment and the other with no additional laser treatment. The final IOP was 18 mm or below in 15 of the 21 eyes. No eyes had a final IOP <8 mmHg, so there was no hypotony.

Discussion

Ciliodestructive procedures have had a bad reputation with regard to preservation of VA and, therefore, traditionally have been reserved for end-stage eyes with limited visual potential. They have been used more for palliation than for preservation of vision. The question has been raised, however, whether the change in vision was a result of the laser treatment or whether it represented progression of the disease. Many of the eyes that were treated had advanced neovascular glaucoma, and these eyes had a poor visual prognosis because of their diabetic retinopathy or retinal vascular disease. Similarly, when the treatment was used in eyes with uveitic glaucoma and some other secondary forms of glaucoma, the question has been raised whether the decrease in vision was due to the underlying ocular disease rather than the glaucoma treatment. In a series of 479 patients treated with noncontact neodymium:YAG cyclotherapy, Youn et al5 reported that almost 40% of the patients had a decrease in VA of 2 lines or greater, but the loss was greater in eyes with neovascular glaucoma.

Recently, Egbert et al3 reported on a series of patients in which 1 eye of each patient was treated with diode laser cyclotherapy as primary therapy. With short-term follow-up, there was a decrease of VA in 23% of the laser-treated

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CF = counting fingers.
eyes and an identical 23% decrease in VA in fellow eyes treated with medication. In a similar vein, the Advanced Glaucoma Intervention Study\textsuperscript{6} showed that approximately 40% of these medically uncontrolled patients treated with either argon laser trabeculoplasty or filtration surgery had at least a 3-line decrease in VA on at least 1 visit during 5 years of follow-up, and in most eyes this was present on multiple visits. Therefore, it seems that some glaucoma patients do have a decline in VA over time, even with these more conventional forms of treatment. Whether this is due to age-related maculopathy, development of cataracts, progression of the glaucoma damage, or something else is not clear, but does suggest to us, at least, that some of the decrease in vision in patients who had had ciliodestructive
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1 & 65 & Male & White & OAG & PC IOL & & YAG \\
2 & 85 & Female & White & NTG & PC IOL & & YAG \\
3 & 52 & Female & Black & Aphakic & & & \\
4 & 80 & Female & White & OAG & PC IOL & & Filter \\
5 & 53 & Male & White & Traumatic & Aphakic & & Corneal Transplant \\
6 & 64 & Male & White & OAG & PC IOL & & Filter \\
7 & 67 & Female & White & OAG & PC IOL & & Filter \\
8 & 76 & Female & White & OAG & PC IOL & & Filter \\
9 & 82 & Female & White & OAG & PC IOL & & Filter \\
10 & 76 & Female & White & Glc post cong cat & Aphakic & & Diode \\
11 & 59 & Female & White & Pupillary block gle & AC IOL & & YAG \\
12 & 13 & Male & White & Infantile & Phakic & & Goniotoy filter \\
13 & 71 & Female & Black & OAG & PC IOL & & Filter \\
14 & 71 & Female & White & OAG & PC IOL & & Filter \\
15 & 65 & Female & White & OAG & PC IOL & & Filter \\
16 & 79 & Female & White & OAG & PC IOL & & Filter \\
17 & 74 & Male & White & OAG & Aphakic & & Corneal transplant \\
18 & 66 & Female & White & OAG & PC IOL & & Filter \\
19 & 59 & Male & White & OAG & Aphakic & & Vitrectomy \\
20 & 78 & Male & White & OAG & Aphakic & & Filter \\
21 & 29 & Male & White & Traumatic & PC IOL & & Filter \\
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\caption{Demographic and Prelaser Findings}
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\end{table}

AC IOL = anterior chamber intraocular lens; ALT = argon laser trabeculoplasty; gle post cong cat = glaucoma after congenital cataract; NTG = normal tension glaucoma; OAG = open-angle glaucoma; PC IOL = posterior chamber intraocular lens; YAG = yttrium–aluminum–garnet.
procedures may be due to the same factors that were operative in the patients in the Advanced Glaucoma Intervention Study who were treated with either laser trabeculoplasty or filtration surgery and are not specific to cyclodestruction.

The patients in this study were treated with 2 different contact laser modalities. In a small, randomized prospective study that we performed, we found that the 2 modalities were similar in IOP reduction and complications (presented at the Association for Research in Vision and Ophthalmology, 1997; Sarasota, Florida). A larger, more recent study by Youn et al\(^1\) found similar results. Therefore, we believe it is acceptable to combine the patients treated with these 2 different laser modalities in this report.

We were disappointed by the clinical results of the laser treatment. A single treatment failed to adequately lower the IOP in 19 of our 21 patients, and 3 required 3 additional laser treatments. These results are poorer than has been reported in the literature. It is possible that this represents a selection bias and that these were patients with severe glaucoma. As was shown in Table 1, 12 of these 21 patients had already had previous failed filtering surgery, in some cases multiple times. Two had had previous corneal transplants, and 1 had a previous vitrectomy. Conversely, we were able to obtain a final IOP between 8 and 18 mmHg in 15 of the 21 eyes.

We believe that the results of this study support our impression that laser cyclotherapy can be used on eyes with reasonably good VA with the expectation that if the IOP is controlled, VA can be preserved on a long-term basis. Only 3 patients had a decrease in VA of 3 lines or greater, and, in 1 of these patients, bullous keratopathy had developed. Moreover, in at least 2 of these 3 patients, IOP was not adequately controlled, and progression of glaucoma damage may have contributed to the decrease in vision as well. Most of these eyes, however, did retain 20/100 or better vision with a follow-up of up to 88 months. Given the fact that many of these patients were fairly old (14 of the 21 were 65 years of age or older), this follow-up period may extend over a good percentage of their remaining life expectancy.

Although a retrospective study of this nature has limitations and the sample size is small, we are encouraged by our findings. We believe that they indicate that laser cyclotherapy as described in this report can be used successfully in eyes with useful vision, and we believe that the indications for laser cyclotherapy should be expanded beyond those included in the American Academy of Ophthalmology policy statement\(^4\).

References