

When Is Laser Trabeculoplasty Indicated as First-Line Treatment?

This proven and effective treatment modality is a powerful option for initial IOP lowering in the newly diagnosed glaucomatous or ocular hypertensive patient.

BY AHMAD A. AREF, MD

The introduction of laser trabeculoplasty (LTP) as a successful technique for decreasing IOP revolutionized the treatment of open-angle glaucoma (OAG). Described by Wise and Witter in 1979 as a relatively noninvasive surgical treatment option for the nonrefractory glaucomas,¹ LTP tested the existing algorithm of initial medicinal therapy followed by penetrating filtering surgery for patients requiring a lower IOP.

Both argon and selective laser trabeculoplasty (ALT and SLT, respectively) act to lower IOP by enhancing aqueous outflow facility. The exact mechanism by which this occurs likely relates to a mechanical alteration of the trabecular meshwork in the case of ALT² and the induction of a favorable biochemical cascade by SLT.³ Numerous reports have confirmed that the two techniques have an equal IOP-lowering efficacy.^{4,5}

With research demonstrating its efficacy, LTP has become a viable alternative for the first-line treatment of many glaucomas.

LTP AS A FIRST-LINE OPTION

The Glaucoma Laser Trial

The results of the Glaucoma Laser Trial (GLT),^{6,7} which became available in 1990, provided evidence that LTP was at least as efficacious as medicinal therapy for the first-line treatment of patients with newly diagnosed primary open-angle glaucoma (POAG). This multicenter, NIH-funded trial involved 542 eyes

of 271 patients. In order to compare the IOP-lowering efficacy of initial laser versus medicinal treatment, investigators randomized one eye of each participant in the study to initial ALT and the fellow eye to initial treatment with timolol maleate 0.5%. A stepped regimen was employed, whereby alternative or adjunctive medicinal therapy (with dipivefrin, low-dose pilocarpine, and/or high-dose pilocarpine in seven distinct steps) was administered to the patient if he or she met predefined criteria for an increase in IOP, visual field progression, and/or progressive deterioration of the optic nerve head.

After 2 years of follow-up, the investigators reported that 44% of the eyes that underwent initial ALT did not require further escalation of therapy within the stepped regimen. Overall, 89% of the eyes randomized to initial ALT were controlled within the stepped regimen compared to 66% in the initial medicinal group at 2 years. By 7 years of follow-up, eyes that had undergone initial ALT experienced a 1.2 mm Hg greater reduction in IOP ($P < .001$) compared with eyes that underwent initial medicinal therapy. Eyes first treated with ALT were also found to have a better visual field and optic disc status than fellow eyes initially treated medically.⁸

There are two common criticisms of the GLT's results.⁹ First is the potential for a "crossover" IOP-lowering effect, in which a study eye initially treated with ALT might have experienced some of its decrease

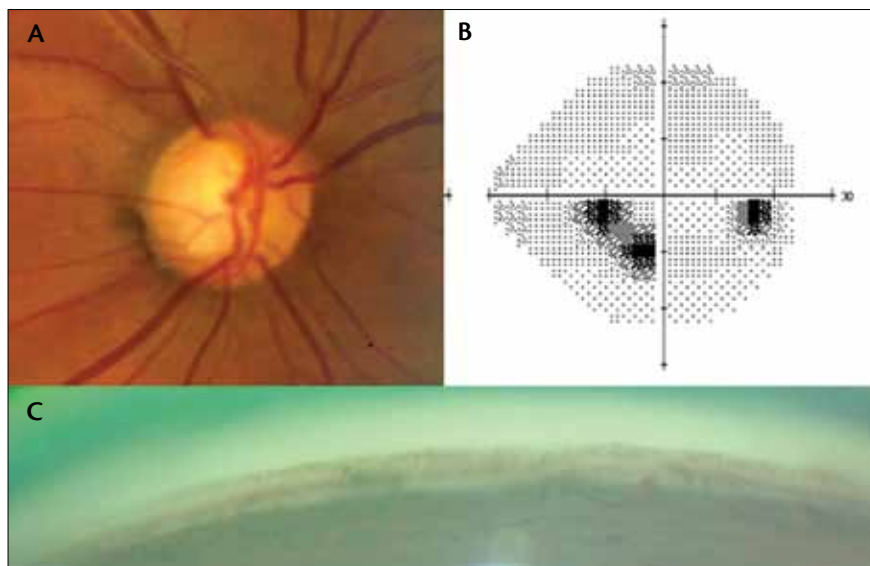


Figure. Optic nerve head photograph (A), visual field plot (B), and gonioscopic slit-lamp photograph (C) corresponding to the right eye of a 41-year-old Hispanic man with newly diagnosed POAG. The IOP of his right eye measured 23 mm Hg. LTP was employed as a first-line intervention for IOP control.

in pressure due to the systemic absorption of timolol administered to the fellow medicinally treated eye. The second criticism is that advancement within the stepped regimen still allowed for effective IOP control with a single topical agent in a greater proportion of eyes treated initially with medicine compared with ALT, presumably due to differing individual responses to the three topical agents then available: timolol, pilocarpine, and dipivefrin.

More Recent Research

The results of a trial conducted by Katz and colleagues¹⁰ challenge the aforementioned criticisms of the GLT and impart a modern-day practicality with regard to the role of first-line LTP, given the current availability of safe and efficacious medical therapies. In a multicenter, prospective, randomized clinical trial, the SLT/MED study group randomized 69 patients, rather than eyes, with newly diagnosed OAG or ocular hypertension (OHT) to initial treatment in one or both eyes with either SLT or a topical prostaglandin analogue. The investigators also employed a stepped regimen for eyes failing to reach the target IOP based on the Collaborative Initial Glaucoma Treatment Study (CIGTS) formula. After 9 to 12 months of follow-up, comparable IOP-lowering was observed in each treatment group (26.4% in the SLT group vs 27.8% in the medicinal group; $P = .77$). In addition, the need for advancement within the stepped regimen was greater

in the medicinal group (24%) compared to the SLT group (11%).

The results reported by Katz and colleagues confirm earlier findings by the GLT study group: initial LTP is at least as efficacious as initial medicinal therapy with regard to IOP lowering in OAG.

INDICATIONS

LTP's efficacy as a first-line method of decreasing IOP in POAG and OHT was demonstrated in the GLT⁶⁻⁸ and SLT/MED¹⁰ studies. Performing LTP in these settings requires a clear gonioscopic view and identifiable anterior chamber angle landmarks. The clinician should believe that the patient requires a further reduction in

IOP in order to decrease his or her risk of glaucomatous progression (Figure). In addition to POAG and OHT, LTP has also been shown to effectively lower IOP in patients with pseudoexfoliative,¹¹ pigmentary,¹² and normal-tension glaucomas.¹³

Although ALT and SLT can achieve an equal reduction of IOP, the latter's remarkable safety profile¹⁴ and potential repeatability¹⁵ support its consideration earlier in the treatment paradigm. Moreover, several studies have shown that patients' adherence to prescribed medical therapy is often problematic, which can lead to glaucomatous progression.^{16,17} Patients who have admitted a likelihood for poor adherence to prescribed medical therapy may therefore be especially strong candidates for LTP as first-line treatment.

Although currently available topical IOP-lowering agents are relatively well tolerated, they still often produce significant adverse effects on the ocular surface, eyelids, and periorbital tissue.¹⁸ Employing LTP earlier in the treatment paradigm might decrease the risk of these adverse effects, because the procedure has been shown to reduce the number of medicines required for IOP control.¹⁹

Finally, primary LTP may save money compared with initial medical therapy. Stein and colleagues²⁰ compared the cost-effectiveness of observation only, treatment with a generic topical prostaglandin analogue, and LTP as initial treatment options for patients with newly diagnosed, mild POAG. The

researchers found that, after accounting for realistic levels of adherence to prescribed therapy, LTP provided the greatest cost savings.

CONCLUSION

The option of LTP as first-line treatment for patients with newly diagnosed OAG is advantageous in terms of efficacy, adherence, and cost. The enhanced safety profile of SLT compared with ALT bolsters LTP's potential role as initial therapy. ■

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