Lasers and Glaucoma Management

Trabeculoplasty is still the most common laser treatment for glaucoma, but newer laser therapies may be on the horizon.

BY L. JAY KATZ, MD

Treatment with lasers is just as prevalent in glaucoma as it is in refractive surgery and perhaps will be in cataract surgery. The most common laser-based treatment for glaucoma is trabeculoplasty, in which the laser is used to lower intraocular pressure (IOP) caused by open-angle glaucoma. The second most common laser treatment for glaucoma is laser iridotomy to lower elevated IOP caused by narrow angles or angle-closure glaucoma. Another common laser approach, cycloablation, is used in complex glaucoma cases such as those that are difficult to treat or those performed in conjunction with cataract surgery. This article reviews the use of laser trabeculoplasty and forecasts possible innovations on the horizon for laser-based glaucoma management.

HISTORY

Laser trabeculoplasty has been a mainstay of treatment for open-angle glaucoma for more than 30 years. In 1979, James B. Wise, MD, was the first to use argon laser trabeculoplasty (ALT) successfully to increase aqueous outflow through the trabecular meshwork and therefore lower IOP in patients with open-angle glaucoma. Since that time, ALT has been one proven tool, in addition to medication and incisional surgery, for the management of glaucoma. In ALT, the laser appears to enhance outflow of aqueous through the trabecular meshwork. Typically, 360° of treatment provides the maximal effect on IOP reduction and repeat application is poorly effective.

Selective laser trabeculoplasty (SLT) with a frequency-doubled Nd:YAG laser was introduced by Mark A. Latina, MD, in the 1990s. As in ALT, SLT improves aqueous outflow; however, it is able to selectively target only the pigmented cells, with little thermal effect, unlike ALT, preserving the surrounding tissue architecture. It has been shown to be as effective as ALT in lowering IOP, but it has much less thermal effect on the angle. One goal of any new laser treatment is to minimize the amount of trauma to the eye, and SLT seems to do that without sacrificing the efficacy of lowering IOP. The other potential advantage of SLT is that it appears more effective than ALT when repeated.

SEQUENCE OF CARE

When do glaucoma specialists use laser treatment in the sequence of care for glaucoma? There is no right or wrong answer, because the sequence varies on a case-by-case basis depending on the doctor and on the patient’s severity of glaucoma, starting IOP, and other life factors. The classic protocol is medication, followed by laser treatment if there is not an adequate level of control or if the patient is intolerant of medication, and incisional surgery as the last resort. Topical medications such as beta blockers (eg, timolol maleate) reduce fluid production, while prostaglandin analogs increase fluid outflow. Some patients may prefer not to be on a lifelong medical therapy due to cost, difficulty with compliance, or local or systemic side effects. In these cases, it is reasonable to start treatment with laser trabeculoplasty. At my center, approximately 10% of patients choose to begin straightaway with laser trabeculoplasty.

TAKE-HOME MESSAGE

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loplasty, whereas 90% begin with some form of topical medication. This may begin with one drop and progress to several medications before I proceed to laser treatment.

The landmark Glaucoma Laser Trial,6 a randomized multicenter trial sponsored by the US National Eye Institute that compared laser and medication as primary treatments for glaucoma, showed that laser was as effective as the first-line topical therapy, which at the time was the beta-blocker timolol maleate. More recently, studies in the United States, the United Kingdom, Canada, and elsewhere have shown that SLT is as effective as the current first-line medical therapy for glaucoma, the prostaglandin analogues.7-9

Over the years, there have been noticeable shifts in practice patterns, as physicians try not to prescribe multiple medications to the patient (which often makes compliance difficult and often provides modest additivity in IOP-lowering) and may rather choose laser as an earlier or even first-line treatment (to avoid the side effects and costs associated with medications). Today, surgeons recommend and patients accept laser at an earlier stage in the treatment process than 10 to 15 years ago. This change has been slow, but when looked at over time it has meant a profound shift from prescribing multiple medications to deploying laser treatment at an earlier stage.

ON THE HORIZON

Several new laser treatments for glaucoma are under investigation today. Two promising possibilities include the use of an excimer laser to create a hole in the trabecular meshwork and a nonpenetrating surgical procedure using a CO₂ laser. It is unclear whether either will emerge as an effective therapy; however, lasers are sure to remain vital in glaucoma treatment.

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