Laser trabeculoplasty has been used to lower the intraocular pressure for more than four decades. Various lasers have been most commonly the Argon laser, Diode laser and continuous frequency doubled ND: YAG laser.

The exact mechanism of how Laser trabeculoplasty acts to reduce IOP is not well understood. Theories include a mechanical effect, a biochemical effect, and a cellular effect. In a recent review Stein and Challa noted that since both lasers have similar IOP reducing effects and safety profile it was likely that both act by the same mechanism. With this background it is reasonable to conclude that the tissue damage occurring with ALT (disruption and coagulation damage to the trabecular tissue and membrane growth over the trabecular meshwork) is not required for the hypotensive effect. The SLT is based on the concept of selective photothermolysis. This results in targeted thermally mediated radiation damage to a selected pigmented cell population within a tissue of mixed cell types of differing pigmentation. Typically the SLT delivers a 400 mm diameter treatment spot (energy 0.4-1.2mJ per spot) in 3 nanoseconds. This results in energy fluence levels to the TM that are several thousand times lower than with ALT. In the trabecular meshwork this acts upon only pigmented trabecular meshwork cells which absorb the laser energy selectively, sparing damage to surrounding tissue. Histo-pathological studies in human eyes have shown intact trabecular beams with absence of coagulative damage. Continuous endothelial lining was found while pigmented trabecular cells showed disrupted pigment granules. The similarity in ocular hypotensive response without the attendant tissue damage have resulted in a recent resurgence in interest in laser trabeculoplasty. Latina et al were the first to publish efficacy data for the SLT.

Comparison between ALT and SLT

Numerous studies show equal efficacy of both the treatments irrespective of previous ALT treatments. The Glaucoma Laser Trial reported that after ALT only 32% of eyes were still controlled with no additional IOP-lowering demonstrated that by 5 years. Both also appear to have similar duration of action, with both techniques losing efficacy over time. Juzych et al performed a retrospective comparison of SLT and ALT, they reported reported success rates (20% or greater IOP reduction without further intervention) in eyes with medically uncontrolled OAG at 1, 3, and 5 years of 58% to 68%, 38% to 46%, and 31% to 32%, respectively, for SLT and 46% to 54%, 23% to 30%, and 13% to 31%, respectively, for ALT.

How much to treat: There is some evidence to suggest that treating a greater part of the angle is likely to result in more IOP reduction. Nagar et al reported that 90 degrees SLT treatment produced lower success rates than either 180 or 360 degrees SLT. While 360 degree treatment appeared to be more effective than 180 degree treatment this did not reach statistical significance. Larger treatment (360 degrees compared to 90 degrees) was associated with greater ocular pain, however IOP spikes and anterior chamber inflammation were similar.

Repeat treatments: There are numerous reports comparing effect of SLT after ALT. There are fewer reports on the efficacy of repeat SLT. In a retrospective case series of eyes undergoing a repeat 360 degree SLT after loss of IOP control following the first treatment Hong et al found that IOP’s did reduce though somewhat less than with the first treatment. Percentage of eyes achieving a 20% or greater IOP reduction within the first month post treatment, at 1-3 month post treatment and at 5-8 months post treatment were 29.5%, 54.5% and 50% respectively following the first treatment and 40.5%, 36.5% and 43.2% respectively after the repeat treatment.

Procedure

Laser Parameters: SLT delivers laser energy using Q-switched ND: YAG laser 0.8 to 1.6 mJ, spot size 400 micro meters. A Goldmann 3 mirror contact lens or the Latina laser lens is used with a coupling medium such as methyl cellulose and placed over the eye. The laser is aimed at pigmented trabecular meshwork.50 non overlapping spots are placed. There is no visible end point but some authors increase the energy till small champagne bubbles are visualised. Pre-treatment with apraclonidine eye drops or systemic acetazolamide should be considered to blunt a post laser IOP spike.
Post procedure topical steroids or NSAIDS and anti glaucoma medications are continued for 4 weeks.

The ocular hypotensive effect usually is first seen after a week and a small additional benefit after 4-6 weeks.

**Indications:** Uncontrolled Ocular hypertension, POAG, pigmentary glaucoma, pseudo exfoliative glaucoma, Poor compliance with medical therapy, intolerance or non response to medical therapy

**Contra indications:** iritis, uveitis and closed angle

**Adverse effects**

Transient IOP elevation. Pain, discomfort and redness, Peripheral anterior synechiae. Anterior chamber inflammation. In pigmentary glaucoma Van de Veire et al reported a paradoxical IOP rise following SLT of nearly 20% that persisted for 12 weeks. In another case series Harasymowycz IOP spikes in 4 patients with heavily pigmented angles, with peak IOP’s ranging from 31 to 65mm Hg, three of them required filtering surgery.

While the SLT is a useful addendum to the glaucoma armamentarium, there is little data on its efficacy or cost effectiveness in Indian eyes. One should keep in mind that IOP reductions are typically modest and do not last for long periods. Patients treated with SLT will need to be on close follow up even post treatment. Care should be taken in eyes with a densely pigmented trabecular meshwork.

**References**