

## SLT on the Front Line

**Gregor Hawlina and Matej Beltram, consultant eye surgeons from Ljubljana, Slovenia, discuss the rise of selective laser trabeculoplasty in the treatment of glaucoma**

Selective Laser Trabeculoplasty, or SLT, is a form of laser surgery that is used to lower intraocular pressure in open-angle glaucoma and ocular hypertension. It uses short laser pulses of a specific wavelength to selectively target pigmented trabecular meshwork cells, without causing widespread thermal damage. SLT has been in use around the world for more than 25 years. Historically, it has been used when eye drop medications fail to lower eye pressure sufficiently or where the drops are causing significant side effects. However, more recently its popularity and adoption as a first-line treatment in glaucoma has been steadily growing, bringing SLT firmly into the spotlight. We started using SLT in the clinic around four years ago.

SLT as a first-line therapy for glaucoma

Glaucoma can affect people of all ages, but is most common in adults in their 70s and 80s. However, where the patient is younger, glaucoma often presents initially as a high intraocular pressure but without pronounced damage to the optic nerve or the visual field. These patients are best placed to receive SLT therapy as a first line of treatment and we have been using SLT predominantly for those patients in our practice.

However, new guidelines have been released recently promoting SLT as the first-line treatment for primary open angle glaucoma and ocular hypertension patients (1, 2). Is this going too far? We don't think so, and this is why: from a commercial standpoint, SLT has a better cost-benefit ratio than other forms of treatment. From a patient standpoint, SLT has fewer adverse

effects than the use of current anti-glaucoma eye drops, particularly when considering repeat treatments.

We advise SLT to younger patients, patients with poor eye drop compliance or adverse side effects, those with ocular hypertension and less serious primary open angle glaucoma.

The prevalence of SLT

SLT is becoming more widespread in its use and popularity. The costs, fewer side effects and ease of repeat treatments are very attractive for glaucoma patients and the healthcare systems that support them. Of course, the widespread use of SLT does depend on accessibility of the device itself. Often this relies upon a favorable oversight and pricing model of the insurance companies and local healthcare policies. Unfortunately, this can lead to some ophthalmology departments avoiding its use because of the perceived costs, especially where these fall to the patient. However, as more and more data emerge on the increasingly attractive safety profile and efficacy of SLT, the cost-benefit equation is becoming harder to ignore.

This brings into focus the need to understand the efficacy of SLT, particularly in comparison with the prescribing of eye drops. Current data indicates SLT is at least as effective as using eye drops, but shows fewer side effects, especially after repeat treatments (3, 4, 5, see the box on the right). This does promote the case for using SLT as a first-

line treatment, where eye drops can then be reserved for those patients who are non-responsive. Our colleagues in Slovenia are still only using SLT in selected groups of patients, but it is definitely changing, and further changes in pricing structures are bound to result in a wider adoption of SLT.

Why are eye drops a less attractive first line treatment?

Patient compliance is essential in glaucoma treatment. Any medication that relies upon the patient to manage remotely their treatment has the potential to fail or be less effective through non-compliance, and this may only be picked up late into the treatment period. Poor adherence to prescribed therapeutics can result in unnecessary changes to the treatment regime, and increased costs to the patient and/or to the healthcare system (6). Crucially, issues with compliance and adherence can have severe consequences to patients' visual function.

As Waterman and colleagues found in their systemic review of randomized controlled trials, even complex interventions aimed at improving adherence, such as patient education and implementing behavioral approaches, cannot be recommended, based on available data (6). Implementing simplified drug regimens as a successful way of increasing compliance and adherence is also not supported by data (6).

Moreover, there are several side effects particular to the eye drops that cloud their

use, some of which are related to the length of treatment. As drugs administered through the eye have access to the patient's systemic circulation and avoid first-pass metabolism, significant amounts of topical therapeutics make their way into the system, with consequences for the patient. The patient will often develop atrophy of the orbital content and thinning of the eyelid. Ptosis of upper eyelid and stenosis of the lacrimal drainage system can develop too, which has cosmetic ramifications, alongside the biological symptoms, which can include dry eye disease. Patients on long-term eye drops also can develop pronounced inflammation and a persistent conjunctivitis which is very hard to cure, requiring both antibiotics and corticosteroids (7, 8).

Meanwhile, the very nature of SLT means that the physician is controlling the treatment, knows it has been undertaken, does not have to consider potential expected and unexpected side effects, and can reliably follow the progress of recovery.

The advantages of the OptoSLT nano

The OptoSLT nano, the SLT device from Optotek, confers many advantages, but of primary importance is its ability to maintain a steady energy level, which is critical when using laser treatment. Variations in energy levels can be damaging to the eye when high, and ineffective as a treatment when they fall. The OptoSLT nano device's energy levels range from 0.2 to 2.0 mJ with a red diode (635 nm) aiming beam, which facilitates precise focusing for highly predictive and effective treatment. It also offers a shorter-than-standard laser pulse duration of just 1 ns, resulting in a quicker and safer SLT treatment. As Pukl and Drnovšek-Olup comment, "Unlike standard 3–5 ns SLT devices which utilise flash lamp-pumped lasers, the new laser is a diode-pumped, solid-state laser. It offers the additional advantages of being more compact, efficient and stable than existing 3–5 ns SLT devices," (9).

In our experience, the fact that OptoSLT nano provides stable energy is essential –

otherwise, when observing an effect such as gas bubbles, no visible result can be seen, which can make the surgeon question effectiveness of the pulses. To perform the therapy evenly throughout the whole trabeculum, stable energy is essential; otherwise, the laser may not be effective on some spots, rendering treatment ineffective.

Practically, the OptoSLT nano is very compact and highly portable in design, which has major benefits for the already equipment-heavy clinics. Importantly, the OptoSLT nano is very cost-effective when compared with a full treatment regime of eye drops. This needs to be recognized by the insurance companies and health care systems, such that these benefits can be passed on to the patients and the option for laser treatment made widely available.

The future of SLT

What are the barriers to widespread SLT adoption? Performing the procedure requires familiarity with a medical device, correct training and experience to be able to deliver successful treatments. The nature of the treatment will also require multiple patient follow-ups, particularly in the early stages of use, to follow recovery and tailor the treatment practice. Understandably, each patient is different and therefore this will demand an individual approach, increasing the number of sessions to bring down the ocular pressure effectively and safely.

SLT relies upon lasers to provide the therapy. This is why it is also useful for the operator to understand a little about lasers and their use in treating illness. However, as is necessary with such devices, these are accompanied by excellent treatment guidelines and training, and these are all readily learnable skills. It takes a little time and investment by the practitioner.

What future do we see for SLT? The combination of fewer side effects, efficacy, and cost will put SLT as the first line treatment of preference for certain types of glaucoma, followed employing eye drops in non-responsive patients.

### The Lancet study results: LIGHT (5)

The multicenter randomized controlled trial compared SLT with eye drops as first-line treatment for OHT and glaucoma in 718 patients over 36 months.

74.2 percent of SLT patients required no eye-drops to maintain target IOP, whereas 65 percent of eye-drop group needed one medication and 35 percent required two or more medications. In the SLT group, there was less disease progression and there were no glaucoma surgeries. As the study showed, SLT has very low rates of adverse events, compared with previously reported outcomes. No systemic adverse events as a result of SLT were reported, and within the SLT group only one IOP spike was reported from 776 treated eyes, which is less frequent than previously thought and further highlights the very low risk profile.

What is more, a lower rate of cataract surgery was observed in the SLT-treated group, confirming previous observations that eye drops used to lower IOP are associated with greater incidence of nuclear cataracts and a need to remove them earlier.

#### References

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