



Clinical Case Report

Complex Cases of Glaucoma

SP-Mode® Laser Therapy Using LIGHTLas 810

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Key Points:

- SP-TSCPC and TSCPC are very easy procedures with few complications.
- TSCPC with LIGHTLas 810 is a good option to treat severe cases of glaucoma.
- SP-TSCPC with LIGHTLas 810 offers a safe procedure for a wide range of indications that is repeatable and comfortable for patients.

Disease Background

Glaucoma is the 2nd most common cause of blindness in the world. It is a disease with a complex etiology, and a chronic progressive optic neuropathy that elevates intraocular pressure (IOP) and visual field loss. The IOP depends on the aqueous humor production and outflow, which is produced at the ciliary body and runs through the pupil to the anterior chamber. It then runs out of the eye through the trabecular meshwork and the Schlemm's canal.

For Transscleral Photocoagulation (TSCPC) and SP-Mode® Microsecond Laser Technology TSCPC (SP-TSCPC), the surgical sites are located at the ciliary body, located 3 mm away from the surgical limbus. The pars plicata, a section of the ciliary body, contains approximately 70-100 ciliary processes and is responsible for producing aqueous humor. The ciliary muscle is made up of 3 different groups of fibers that run in various directions - longitudinal, radial and circular. These ciliary muscles play an important role in the dynamics and outflow of aqueous humor.

Diagnosis Tools to Study the Surgical Site

The UBM (ophthalmic ultrasound biomicroscopy) presents real time images of the deep ocular structures using high-energy sonic waves. With this live imaging system, it is possible to see the exact location of the ciliary body. This is helpful in difficult cases as it ensures the specific location at which to apply the laser treatment. It is also important to see all the angle structures with gonioscopy to understand the physiopathology, and to classify the type of glaucoma before deciding on the treatment plan.

Glaucoma Treatment Solutions

There are many types of laser to treat glaucoma. For the first line of treatment, it is preferable to perform Peripheral Iridotomy (PI) or Selective Laser Trabeculoplasty (SLT). TSCPC and SP-TSCPC are used to treat mild to severe glaucoma, refractory glaucoma or patients who need glaucoma surgery who are not candidates for a trabeculectomy or a tube.

Understanding the Evolution of Laser Technology

Cyclodestruction procedures have been performed for many years with a high rate of complications. These procedures are used to decrease IOP by modifying the production of aqueous humor at the ciliary body. Mainly used in refractory glaucoma in eyes with less than 20/200 BCVA (Best Correct Visual Acuity), cyclodestruction was reserved for special cases due to the high rate of complications, such as inflammation or phthisis bulbi from overtreatment.

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Now, there are more advanced solutions using laser treatments. For TSCPC and SP-TSCPC, an infrared diode (810 nm wavelength) is used. This laser has great absorption in melanin containing tissues, and targets directly over the ciliary body. The goal of this technology is to increase the outflow of aqueous humor without necrosis of the surrounding tissues, while decreasing IOP.

TSCPC with the conventional continuous wave (CW) technology is the traditional cyclophotocoagulation. The SP-Mode® Microsecond Laser Technology is a novel approach to treating the ciliary process and avoids the negative side effects of the traditional CW laser. Laser energy is applied over the area causing biological changes on the pigmented cells without damaging the surrounding areas and with no risk of phthisis bulbi. The concept of duty cycle is the relationship between the “on time” over the “off time.” No energy is delivered to the eye during the “off time.” As a result of this process, there is no thermal damage or necrosis were the laser is applied, preventing burn and collateral damage.

There are three mechanisms of action for SP-TSCPC. First, cyclomodulation generates a biological reaction on the cells. Second, the contraction of longitudinal fibers of the ciliary muscle causes contraction of scleral spur, opening the trabecular meshwork and Schlemm’s canal which allows aqueous humor to flow easily through it. The third mechanism is related to the modification on the cell junction between the ciliary body, choroids, and sclera to increase the outflow through the uveoscleral space.

Treatment Protocol

TSCPC and SP-TSCPC are performed under peribulbar inferior anesthesia with hypnoanalgesia and topical proparacaine drops. A blepharostat can be used to keep the eye open. It is important to identify the location of the ciliary process and pars plana at 3 mm away from the limbus, using a caliper and marking 3, 6, 9, and 12 hours. This helps to facilitate the rotation of the probe in an arc motion without losing the 3 mm distance. Lidocaine gel is applied over the eye to help the probe move in a smooth and easy motion. Sometimes it is necessary to move the eye with a 0.12 forceps. The power is around 2,000 or 2,500 mW per cycle. Each cycle lasts 80 seconds and goes over the superior and inferior ocular hemisphere without touching 3 and 9 hours.

It is important to wash the eye surface with Ringer’s solution after the procedure to clean the lidocaine gel and prevent keratitis. It is also recommended to use dexamethasone and analgesic intravenous and to patch the eye for a few hours. Oral analgesics and topical eye drops of prednisolone acetate is recommended for a

week. After treatment, have the patient stop using prostaglandin analog and oral acetazolamide if they were using it before, but continue with timolol/dorzolamide eye drops twice a day to maintain IOP control.

Clinical Cases

CASE 1

A female patient, 22 years old, was born with Rubeolic Syndrome. She had secondary pseudophakic glaucoma and had her first surgery when she was 2 years old. On her right eye (OD), she had one glaucoma surgery and on her left eye (OS), she had six glaucoma surgeries. Two of the surgeries included glaucoma valve implants, and now she has chronic corneal edema because of an intensive eye rubbing issue, especially in the left eye with BCVA light perception and 18 mmHg. Her OD BCVA was (-4D) 20/100 and 40 mmHg with maximum therapy. She was treated in 2019 with SP-TSCPC on her OD because it was less aggressive for someone prone to eye rubbing. After the treatment, her visual acuity improved to 20/70 and the IOP is 12 mmHg with Brinzolamide 2 times per day.

The patient is happy and comfortable and was able to keep her vision. Using SP-TSCPC gives her more opportunities to have future procedures in case she needs them.

Fig 1A

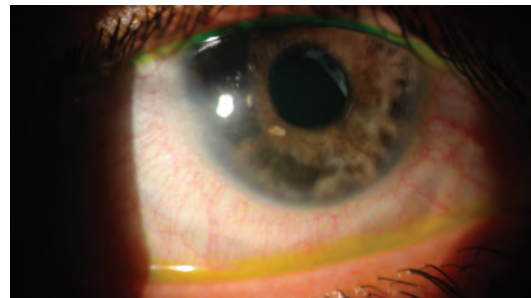
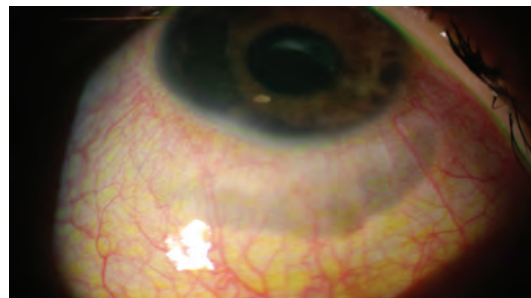


Fig 1B



Figures 1A and 1B: Ocular characteristics of Case 1 patient pre and post laser.

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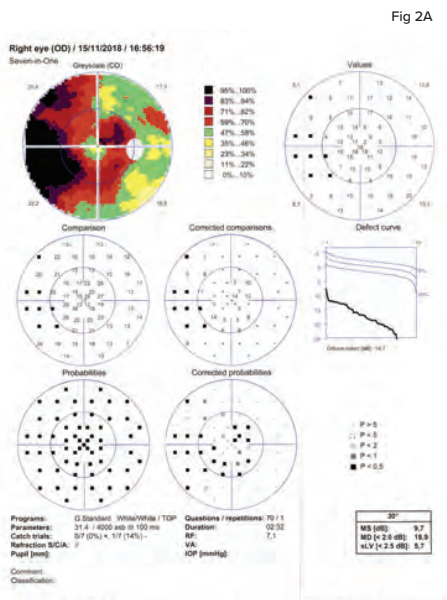


Fig 2A

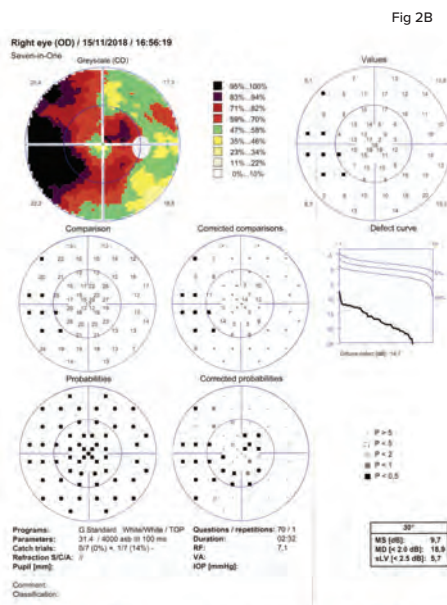


Fig 2B

Figures 2A and 2B: Visual fields before SP-TSCPC and post treatment.

CASE 2

A female patient, 76 years old, has pseudoexfoliative glaucoma and pseudophakia with multifocal intraocular lens in both eyes. She developed a mild conjunctiva lymphoma B MALT type on her OS and was treated with chemotherapy. Her visual acuity was OD 20/20 and OS 20/25. The IOP was 16 mmHg with dorzolamide/timolol. But the OS had 35 mmHg IOP with maximum therapy, treated with latanoprost, brimonidine/timolol plus oral acetazolamide. There was evidence of progression on the visual field and was refractory to treatment. A trabeculectomy or a glaucoma valve was not an option

due to the conjunctiva characteristics of the patient. SP-TSCPC was performed in 2019 with very good results. She had rapid recovery that led her to be able to continue with her chemotherapy. She kept her visual acuity and the IOP is 12 mmHg with timolol/dorzolamide.

This procedure allowed for control of the patient's IOP without affecting the conjunctiva, and offered fast recovery to her daily activities.



Fig 3

Figure 3: Ocular surface of patient with mild type B lymphoma.

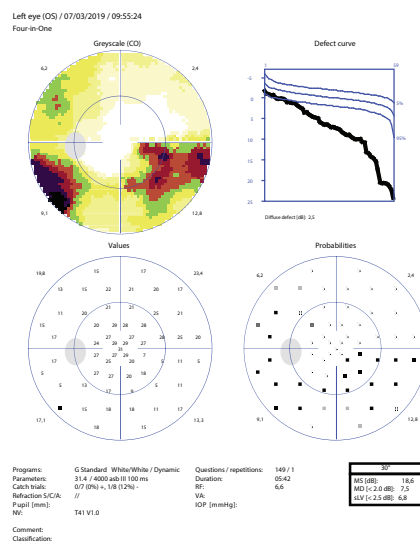


Fig 4A

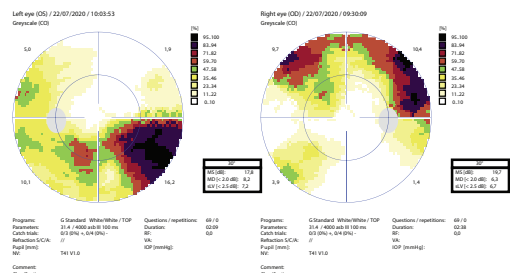


Fig 4B

Figures 4A and 4B: Visual field progression of Case 2 patient's OS.

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CASE 3

A female patient, 71 years old, has a bilateral restrictive ptosis (lids maximal opening less than 5 mm) with enophthalmia and limited supraduction. She was diagnosed with severe glaucoma damage and was treated with eye drops and SLT. She has cardiac arrhythmia, so it was not possible to use beta blocker eye drops. The BCVA is 20/20 in both eyes. The IOP under treatment was off target (between 18 and 21 mmHg). Glaucoma surgery was not possible because there was no access to the superior conjunctiva. The best solution was to perform bilateral SP-TSCPC on two different days for each eye. As a result, she had IOP pressure of 13 mmHg (OD) and 14 mmHg (OS) with brinzolamide/brimonidine eye drops twice a day.

Fig 6B

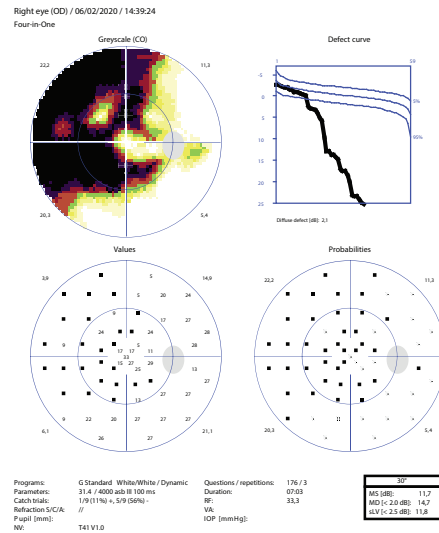


Fig 5

Figure 5: Case 3 patient's ptosis and dyscoria related to laser application at 6 hour.

Figures 6A and 6B: Visual fields of OD pre and post SP-TSCPC.

Conclusion

SP-TSCPC and TSCPC are very easy procedures with fewer complications. The learning curve is short and it is possible to repeat the treatment. The patients are happy because of a comfortable and fast recovery with fewer post-operative visits. TSCPC with the LIGHTLas 810 remains a good option to treat severe cases of glaucoma, also combined with SP-TSCPC. And SP-TSCPC is the latest evolution of the diode laser that offers safe treatments for a wide range of indications, ensures good patient compliance, and allows for repeat treatments.

LIGHTMED Glaucoma Solutions:

- LIGHTLas YAG for Peripheral Iridotomy
- LIGHTLas SLT for Selective Laser Trabeculoplasty
- LIGHTLas 810 for Transscleral Cyclophotocoagulation
- LIGHTLas 810 with SP-Mode® for Transscleral Cyclophotocoagulation SP-TSCPC
- TruScan Pro for SP-Mode® Laser Trabeculoplasty (SPLT)

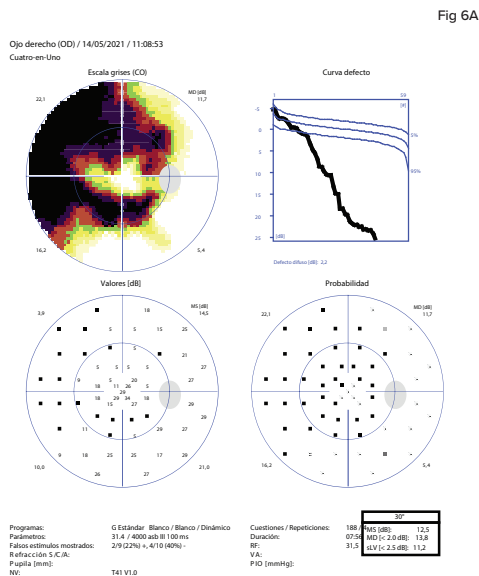


Fig 6A