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Lessons Learned: SubLiminal Laser Therapy for Chronic CSC

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The chronic form of central serous chorioretinopathy (CCSC) is a common form of macular disease and can be characterized by vision loss as well as a decrease in contrast sensitivity and reading speed due to prolonged serous detachment of the neurosensory retina. Although studies have found genetic associations, we know that CCSC mainly affects males over 40 years of age with anxious personalities, high stress factors, and exposure to various types of corticosteroids including systemic or local administered forms.

OUTLOOK THROUGH EXPERIENCE

Subliminal laser therapy (SubLT) is a kind of subthreshold laser, a treatment option that has shown efficacy and safety for treating CCSC with no known side effects.[1] I started using the EasyRet 577 nm SubLiminal laser (Quantel Medical) approximately 18 months ago and would like to discuss my experience with this technology and key learnings through a series of cases. If you are not familiar with SubLT technology, let us start with a few basic questions: how is it done, what it is good for, and how will this technology improve your daily practice?

Unlike traditional laser photocoagulation, which uses a continuous wave of laser beam, SubLT uses short microsecond laser pulses. This allows the targeted tissue to cool between laser pulses thus preventing visible cellular damage, pigmentary changes, or other cicatricial changes. The application technique for SubLT is relatively unchanged when compared to traditional macular laser technique. What does change is the concept of why we are doing it. With SubLT, we are not targeting single aneurisms or aiming to burn a leaking point. SubLT is based on photostimulation. Although we ignore the detailed mechanism of why subthreshold laser works, we know that the photostimulated retinal pigment epithelium (RPE) cells produce antiexudative and tissue-repairing molecules with positive therapeutic effects in their surrounding tissues.[2,3]

Understanding the photostimulation concept means treating large areas and treating them entirely so a large enough number of RPE cells is "recruited" to work for us, since the "productivity" of a few cells is small. Individually titrating the power of the SubLT so we use enough power to cause a therapeutic response–while remaining subthreshold–is also important. There is no need to destroy tissue to obtain a therapeutic response. For my typical settings, see *Table*.

The SubLT comes equipped with a few features that will help you achieve optimal outcomes. Depending on the particular case, you can customize the treatment laser pattern from a single spot or create your own macular grid from any reference point. A useful feature is that if the procedure gets interrupted, you can reset your reference point, and the treatment will resume where it left off (Figure 1).

A GAME CHANGER

SubLT has been a game changer for my routine practice. Previously, I was unable to treat patients with CCSC effectively and sent patients to a surgical reference center for treatment with

TABLE. SUBLIMINAL LASER THERAPY PARAMETERS

Step 1:	Step 2:
Titrate Power (with single spot)	Treatment Settings (with square/macular grid patterns)
Spot size: 160 µm	Spot size: 160 µm
Exposure time: 200 ms	Spacing: 0
Duty Cycle: 5%	Exposure time: 200 ms
Increase of the power step-by-step until reaching a just visible endpoint (barely visible threshold burn) at the healthy periphery of the area to be treated.	Duty Cycle: 5% Use 33% to 50% of the threshold power level reached during the titrate step. I am currently working at 33%. Dense treatment of the leakage area (FA[a]-guided treatment) or the area of altered RPE[b] (AF[c]-guided treatment) for CCSC[d]. Avoid foveal treatment (the fovea is small; excluding it will not affect the outcomes, and you will be safer).*

[a]Fluorescein angiography (FA)
[b]Retinal pigment epithelium (RPE)
[c]Autofluorescense (AF)
[d]Central serous chorioretinopathy (CCSC)
*Autofluorescence at the visit after treatment is advisable to make sure you are within subthreshold range. If visible spots appear, lower your power.

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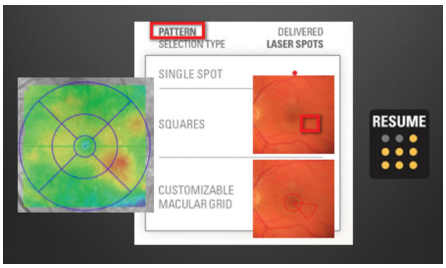

Figure 1. The SubLT customized laser pattern interface.

photodynamic therapy (PDT). In the time I have been using SubLT, I have achieved improvement in nine out of ten cases, with complete resolution in seven of them. Compared to PDT for CCSC, I have found that subthreshold is easier to perform since you do not depend on verteporfin injection (Vysudine, Novartis), and the patient does not need protection from solar radiation afterwards. So far, SubLT efficacy is remarkable as the following cases exemplify.

A 36-year-old woman presented with fluctuating scotoma of a 5-month duration. We performed SubLT; at her 12-week follow-up the subretinal fluid resolved, and the scotoma disappeared (Figure 2). Her VA remained at 1.0 (20/20).

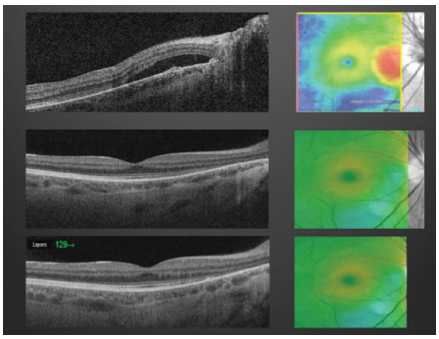

Figure 2. OCT before and after SubLT of a patient with a fluctuating scotoma. The bottom slide is 1 year after treatment.

In another case, 6 months of evolution, we obtained improvement at week 6 after SubLT. At the 12-week follow-up, there was complete resolution of the subfoveal fluid. Even though some peripheral fluid remained away from the central macula, the patient improved from 0.6 (20/30) to 0.8 (20/25) VA (Figure 3).

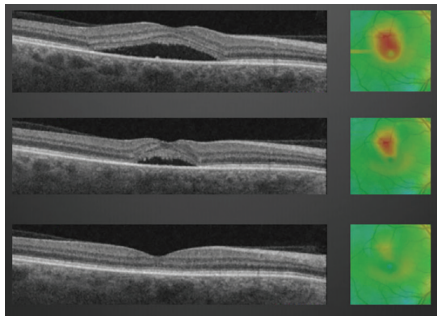

Figure 3. OCT showing complete resolution of subfoveal fluid.

Lastly, I present a chronic case that evolved over a long time period belonging to a 52-year-old general practitioner. Even in this severe chronic case, SubLT was able to "dry" the subretinal fluid. Although the damage to photoreceptor cells was established, the SubLT treatment was able to stabilize the patient. His 1-year follow-up examination showed a stable VA of 0.3 (20/60) and no recurrence of the fluid (Figure 4).

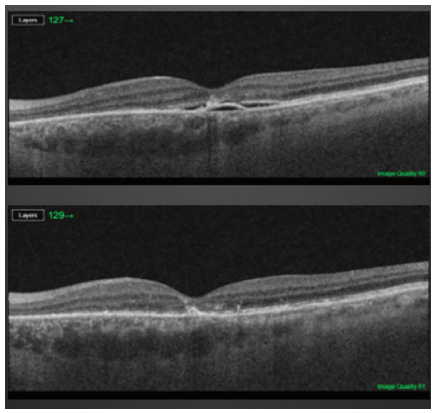

Figure 4. OCT showing stable VA and no recurrence of fluid at 1 year.

PDT VERSUS SUBLT

Although PDT is considered the gold-standard treatment option to treat CCSC, it is known to lead to a number of side-effects such as choroidal neovascularization, choriocapillaris ischemia, and RPE atrophy. Not to mention the cost of Visudyne and the aforementioned precautions the patients must take afterwards. A 56-year-old male presented with both eyes affected by CCSC (left eye with low vision due to long-term, aggressive CCSC). After two failed PDT treatments on his right eye, we were able resolve the intraretinal cysts and subretinal fluid in a single treatment (Figure 5). The patient's VA improved from 0.6 to 0.9 (20/30 to nearly 20/20). A recent study concluded subthreshold 577 nm laser to be a good alternative to PDT for the treatment of CCSC.[4]

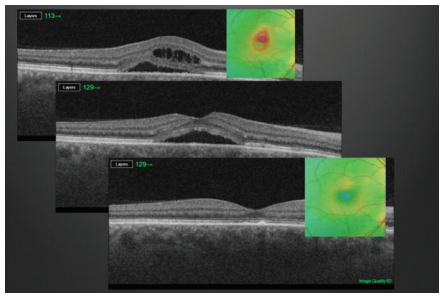

Figure 5. OCT after failed PDT, followed by SubLT therapy.

CONCLUSION

My 18 months with the EasyRet 577 nm SubLiminal laser have been, and currently is, an exciting experience. SubLT is an advanced technology and therapeutic tool that may help our patients. In my experience, the outcomes have been significant for CCSC. SubLT is more surgical than medical retina, so your personal experience is vital. It is a safe procedure as long as you work carefully and have an understanding of the laser parameters. ■

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2. Inagaki K, Shuo T, Katakura K, et al. Sublethal photothermal stimulation with a micropulse laser induces heat shock protein expression in ARPE-19 cells. *J Ophthalmol.* 2015; 2015:729792.
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