

# SubLiminal Laser Therapy for Central Serous Chorioretinopathy



Finding an Effective Treatment Option With No Side Effects

BY PAULA SCHOLZ, MD, FEBO

Central Serous Chorioretinopathy (CSC) is a challenging disease with causes that are still not fully understood. Occurring most often in young and middle-aged adults, CSC can present itself as an acute, yet temporary, loss of vision, or can become a chronic recurring disease.

Acute CSC is the most common form with an often-spontaneous remission, meaning direct treatment may not always be necessary. It can be diagnosed by observing accumulation of subretinal fluid in OCT and typical pinpoint leakage in fluorescein angiography. This observation, along with a complete dilated eye examination, will enable you to distinguish CSC from other retinal disease-causing fluid accumulation in the macula region.

The chronic form of CSC, diffuse retinal pigment epitheliopathy, can also present with subretinal fluid accumulation but with the onset of permanent structural damage. In CSC, treatment before irreversible structural damage is critical.<sup>1</sup>

## WEIGHING TREATMENT OPTIONS FOR CSC

There are several different treatment options for CSC. Observation without treatment is an option in early cases, however, the risk of chronification and irreversible structural damage rises with disease duration. Anti-VEGF has been widely unsuccessful, with the exception of cases with choroidal neovascularization (CNV) formation as a side effect.<sup>2</sup> Conventional laser photocoagulation introduces a high risk of scotoma, CNV, and a reduction of contract sensitivity.<sup>2</sup> Given the risk, this is not a recommended treatment option.<sup>1</sup> Half-dose photodynamic therapy (PDT) is a very effective treatment option, but it comes with a risk of retinal pigment epithelium (RPE) atrophy, CNV, choroidal ischemia, and visual field defects.<sup>3</sup> Due to the potential side effects, PDT treatment should be used only with extreme caution in early CSC cases. SubLiminal laser is the one treatment option that has shown effectiveness of treating CSC and offers no known side effects.<sup>4</sup>

## SUBLIMINAL LASER TREATMENT FOR CHRONIC CSC WITH PERSISTENT SUBRETINAL FLUID

Since CSC can regress spontaneously; monitoring without treatment for approximately 6 weeks is considered the first step. In selected cases of a persistent serous detachment, earlier treatment should be considered. Other observations for early treatment include visual impairment due to CSC on the other eye, a recurrence of serous detachment, a need for rapid visual improvement, or a high level of suffering experienced by the patient.

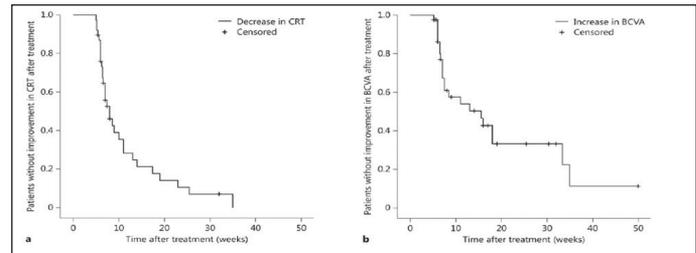


Figure 1. Patients in Dr. Scholz's study experienced a morphological response faster than a functional response.

SubLiminal laser is the one CSC treatment option that has shown efficacy and safety with no known side effects. To further test and validate, two retrospective studies were performed at the University of Cologne in Germany to evaluate the treatment outcomes and to compare against half-dose PDT.<sup>3,4</sup>

The first study examined 38 eyes of consecutive patients treated with a 577 nm SubLiminal laser (Quantel Medical). Patients with any treatment in the past 3 months were excluded, and the mean follow-up was 5 months. The study indicated that 74% of patients responded to the therapy with a significant decrease in central retinal thickness (CRT) and a significant increase in BCVA (Figure 1). Additionally, no laser burns were detected with any imaging modality.<sup>3</sup>

In a subgroup of patients resistant to prior half-dose PDT treatments, 61% responded to the SubLiminal laser treatment with 11% showing complete resolution of subretinal fluid and 50% showing a reduction of subretinal fluid.<sup>2</sup> The study further demonstrated a significant decrease in CRT, however, no significant increase in BCVA was seen in patients with a prior PDT treatment. In this subgroup, 39% of patients showed no improvement.<sup>3</sup>

## COMPARISON OF 577 nm SUBLIMINAL LASER TREATMENT AND HALF-DOSE PDT IN PATIENTS WITH CHRONIC CSC

Since we now understand that subthreshold laser treatment is effective in treating CSC patients, a comparison of SubLiminal laser results with the half-dose PDT, a widely used treatment for CSC, was required. The retrospective study included 100 patients: 42 patients were treated with the 577 nm SubLiminal Laser, and 58 patients were treated with half-dose PDT. Patients with any prior treatments were excluded.<sup>4</sup>

At the 6-week follow-up, there was a significant decrease in CRT after both treatments.<sup>4</sup> The SubLiminal laser group showed a higher decrease in CRT and a significant increase in BCVA. The overall

Sponsored by Quantel Medical

treatment response was higher after SubLiminal laser. Interestingly, in both groups, a second treatment increased the treatment response rate, indicating that is not always necessary to switch after one unsuccessful treatment, especially with SubLiminal laser therapy as there is always the possibility of undertreatment.<sup>4</sup>

**FINDING A SAFER SOLUTION: 577 nm SUBLIMINAL LASER VERSUS HALF-DOSE PDT**

The SubLiminal laser group indicated that there were no laser burns or structural changes detected with any imaging modality; no side effects were reported.<sup>3</sup> The half-dose PDT cohort reported that one patient developed CNV, while one patient suffered from a moderate allergic reaction during verteporfin injection. No structural changes were detected with any imaging modality, but RPE atrophy, CNV formation, choroidal ischemia, and visual field defects were reported side effects in other studies.<sup>4</sup>

**ADVANCES IN THERAPY**

In a recently published review article,<sup>1</sup> we evaluated the subthreshold SubLiminal laser for the treatment of macular diseases. We included 17 studies and weighted the change in CRT and BCVA based on the number of included patients in each study. We found that the change in CRT and BCVA was highest after SubLiminal laser therapy followed by PDT; there was almost no change with baseline observation (Figure 2).<sup>1</sup>

SubLiminal laser therapy showed the highest level of efficacy for CSC treatment, and 64% of patients showed no subretinal fluid after SubLiminal laser therapy compared to 46% after PDT and

	Treatment	Change in CRT (µm)	Change in BCVA (ETDRS letters)
CSC	SL	-131 (range: -69.7 to -204)	6.34 (range: -15 to 20)
	PDT	-85 (range: -76 to -109.8)	3.87 (range: 2 to 8.5)
	Observation	-25 (range: 26 to -89)	0.67 (range: -2.1 to 2.5)

Figure 2. Treatment outcomes after SubLiminal laser therapy, PDT, and observation for CSC.

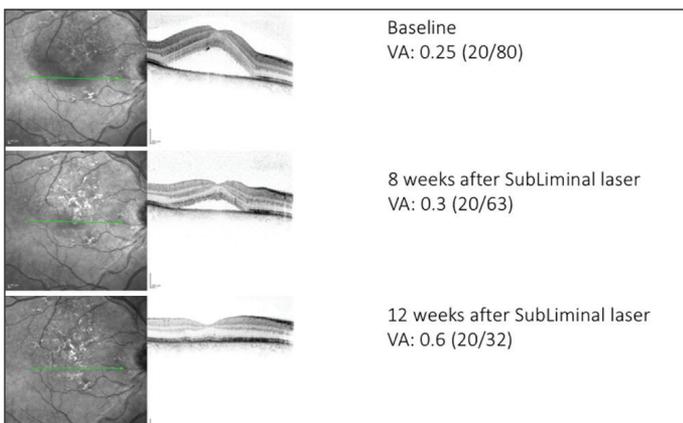


Figure 3. SubLiminal laser therapy at baseline, 8 weeks, and 12 weeks.

8% after observation.<sup>1</sup> There were no reported complications after up to five SubLiminal laser therapy sessions in any of the included studies indicating that early treatment could be considered for potentially better results.<sup>1</sup>

To demonstrate these findings, consider the following patient case reports. Initial exam showed a noticeable amount of subretinal fluid with a baseline VA of 0.25 (20/80). There was a significant reduction in subretinal fluid and VA increased to 0.3 (20/63) 8 weeks after SubLiminal laser therapy. At this point, it was decided to hold off further treatment and observe. At 12 weeks, there was no indication of subretinal fluid with a VA of 0.6 (20/32) (Figure 3).

Determining follow-up SubLiminal laser therapy can be challenging. In the previous case, observing the patient for an additional 4-weeks garnered positive results. In the following case, the patient presented with a baseline VA of 0.16 (20/125) with a very large amount of subretinal fluid. Six weeks after SubLiminal laser therapy, there was no evidence of subretinal fluid centrally, but residual fluid in the upper vascular arcade was present, and the patient presented with a VA of 0.6 (20/32).

As in the previous case, a decision was made to observe and reexamine after 3 months. But in this case, the patient returned with a VA of 0.16 (20/125) and a large amount of subretinal fluid formation. Six weeks after the second SubLiminal laser treatment, the subretinal fluid disappeared completely with a VA of 0.8 (20/25).

**CONCLUSIONS**

Considering the available evidence and studies presented, it is demonstrated that SubLiminal laser is an effective and safe treatment for CSC. In the presented studies, SubLiminal treatment showed a stronger treatment response, compared to PDT, and it has shown effectiveness even in patients with failed PDT. Since there are no known side effects in SubLiminal laser treatment, an early treatment could be considered for potentially better results and to avoid permanent structural damage and lasting visual impairment due to chronification of the disease.<sup>1</sup> ■

- Scholz P, Altay L, Fausser S. A review of subthreshold micropulse laser for treatment of macular disorders. *Advances in Therapy*. 2017;34(7):1528-1555.
- Koss MJ, Begerl I, Koch FH. Subthreshold diode laser micropulse photocoagulation versus intravitreal injections of bevacizumab in the treatment of central serous chorioretinopathy. *Eye (Lond)*. 2012;26(2):307-314.
- Scholz P, Lebriz E, Boon CJF, Fausser Sa. Subthreshold micropulse laser (577 nm) treatment in chronic central serous chorioretinopathy. *Ophthalmologica*. 2015;234(4):189-194.
- Scholz P, Altay L, Fausser S. Comparison of subthreshold micropulse laser (577 nm) treatment and half-dose photodynamic therapy in patients with chronic central serous chorioretinopathy. *Eye (Lond)*. 2016;30(10):1371-1377.

**PAULA SCHOLZ, MD, FEBO**

- Department of Ophthalmology, University of Cologne, Germany
- paula.scholz@uk-koeln.de
- Financial disclosures: Speaker Honorarium (Quantel Medical)