A twin-centre study evaluating the efficacy of Grid subthreshold laser with parameters of Visual acuity, Central subretinal fluid, recurrence rate and PROMS in Central Serous Retinopathy (CSR)

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Introduction

Central Serous Retinopathy (CSR) is a common retinal condition that primarily affects young individuals, characterised by active neurosensory detachment due to serous fluid accumulation beneath the macula, leading to blurred vision and potential long-term retinal damage. Traditionally, CSR has been managed through observation for long period of time, with treatments like photodynamic therapy (PDT- ½ dose) and laser therapy posing risks of central vision damage, particularly with repeated use.

This twin-centre study aims to evaluate the efficacy of sub-threshold laser therapy in the management of Central Serous Retinopathy (CSR). Specifically, it investigates three primary objectives:

1) Assessing the overall effectiveness of sub-threshold laser treatment in CSR
2) Comparing clinical outcomes among grid subthreshold laser to previous treatment outcomes with focal laser treatment modalities
3) Exploring whether early intervention with subthreshold laser alleviates visual disturbances & reduces anxiety due to potential vision loss in younger patients

The study not only focuses on objective clinical measures but also considers the impact on patient's quality of life by exploring PROMS.

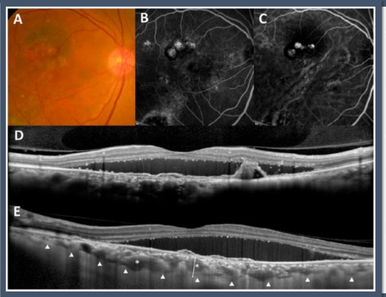
Methodology

All patients underwent a detailed medical history to rule out known predisposing factors for Central Serous Retinopathy (CSR), including steroid use, psychological stress, hypertension, and renal disorders.

Additional factors assessed were type A personality traits, sleep disturbances, use of psychotropic medications (e.g. antidepressants, anxiolytics, and stimulants), pregnancy—particularly in the third trimester—Cushing's syndrome (endogenous hypercortisolism), use of phosphodiesterase inhibitors such as Sildenafil, possible Helicobacter pylori infection and smoking/ alcohol consumption. Demographic risk factors such as male gender and middle age, which are commonly associated with CSR, were also analysed.

All patients underwent vision assessment and optical coherence tomography (OCT) at baseline, 1 month, 3 months, and at 6 to 12 months. A brief Patient-Reported Outcome Measures (PROMs) questionnaire was administered at the end of the treatment period to assess subjective outcomes.

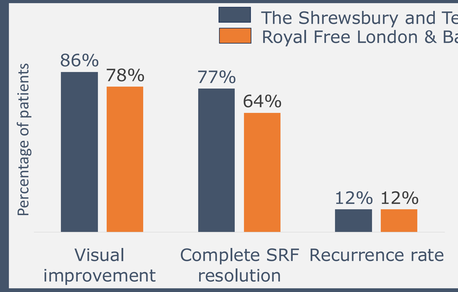
Typical images of pachychoroid neovasculopathy

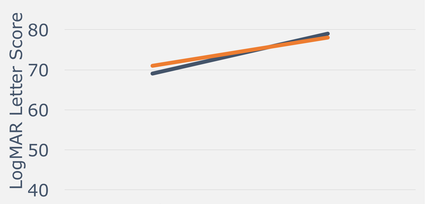


A. Colour photo reveals an orange-red nodular lesion, serous retinal detachment, and hard exudates.
B. Fluorescein angiography reveals a window defect corresponding to RPE atrophy and occult choroidal neovascularization.
C. Indocyanine green angiography shows choroidal neovascularization and some polypoidal lesions.
D. A vertical OCT scan through the fovea shows subretinal fluid and protrusion of retinal pigment epithelium.
E. A horizontal OCT scan through the fovea shows thickened sub-foveal choroidal thickness (triangles) and pachy vessels (asterisks).

Results

Parameters	The Shrewsbury & Telford Hospital	Royal Free London & Barnet General Hospital
Total Patients	35	52
Diagnosis Criteria	Chronic CSR (≥3-6 months) and early recurrent CSR	Chronic CSR (≥3-6 months)
Diagnosis Method	FFA + ICG (initial), OCT/OCTA (later)	OCT or FFA (consultant dependent)
Laser Device	PASCAL Laser (Topcon)	Quantel EasyRet (Lumibird)
Wavelength	577 nm (yellow)	577 nm (yellow)
Laser Mode	Pattern scan + Endpoint Management + Landmark	Subthreshold micropulse
Treatment Approach	Focal + grid (initial cohort); Grid-only (later cohort)	Grid-only
Baseline Visual Acuity	≤6/12 (mean LogMAR 0.32 ± 0.18)	<6/6 (mean LogMAR 0.28 ± 0.18)
Post-Treatment Visual Acuity	Mean LogMAR: 0.11 ± 0.08	Mean LogMAR: 0.14 ± 0.08
VA Improvement (≥2 lines ETDRS)	86% overall (Initial: 80%; Later: 90%)	78% (41/52)
Sub foveal Detachment	Pre: 135 µm ± 36 Post: Initial: 25 µm ± 32 Later: 0 µm ± 15	Pre: 132 µm ± 42 Post: 66 µm ± 42
Complete SRF Resolution	77% overall (Initial: 47%; Later: 100%)	64% (33/52)
Recurrence Rate	12% (4 patients)	12% (6 patients)
Complications	None	None
PROMs	Improved vision satisfaction, reduced anxiety, better QOL	Confirmed visual function improvement and subjective benefit
Limitations in PROMs	Not validated (custom questionnaire used)	Not validated (subjective feedback)





Summary of findings

- Grid-only subthreshold laser (later group) provided excellent anatomical resolution and superior functional recovery, even in early recurrent CSR (despite not meeting chronicity).
- Focal + grid approach in the chronic group showed moderate success, but anatomical resolution was not always paralleled by visual gains.
- Landmark mode with Pascal EPM appears safe and effective for both CSR subtypes, without complications.

Key Insights

- Shrewsbury & Telford's later cohort (grid-only) outperformed others in SRF resolution (100%) and visual acuity gains (90%), despite not always meeting strict chronicity criteria.
- Royal Free & Barnet (grid only) showed solid functional outcomes, but less anatomical resolution (64% SRF clearance) compared to Shrewsbury's later group.
- Both sites reported no complications and similar recurrence rates (12%).
- Patient satisfaction and psychosocial benefits were noted at both centres, although neither used validated PROM tools.

Conclusions

Our findings suggest that subthreshold PASCAL laser therapy is a safe and effective alternative for the treatment of recurrent central serous retinopathy (CSR), offering significant benefits while minimising risk to central vision. The results emphasize that grid laser application to the area of Pachychoroid is sufficient to treat CSR when performed in a timely manner, guided by OCT imaging and fundus photography depicting dilated choriocapillaris.

The use of anatomical landmarks in Endpoint Management (EPM) should be meticulous to ensure precise targeting within the macula. Grid-pattern subthreshold laser therapy proved to be an effective modality for managing CSR. Our study demonstrates that both PASCAL with Endpoint Management and EasyRet with Micropulse technology are equally effective in treating CSR.

Additionally, early intervention with subthreshold laser therapy leads to improved visual outcomes and reduced recurrence rates. Prolonged presence of subretinal fluid (SRF) contributes to retinal pigment epithelium (RPE) dysfunction, with associated macrophage activation further compromising visual prognosis.

Subthreshold laser therapy offers a non-invasive, safe, and promising treatment option for patients with recurrent CSR. It significantly improves retinal fluid resolution and visual acuity, with a low incidence of complications. Further long-term studies are warranted to validate the durability of these outcomes and to optimize treatment protocols. Patient-reported outcome measures (PROMs) can also be utilized to assess both subjective and objective improvements in vision and to explore the dissociation between SRF resolution and visual outcomes.

References

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