

Visual and anatomical outcomes of central serous chorioretinopathy patients presenting to a tertiary unit: a prospective analysis

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Abstract

Aim: The aim of this study was to prospectively define the characteristics and outcomes of a cohort of central serous chorioretinopathy patients using optical coherence tomography imaging to determine anatomical disease resolution. Much of the literature available on the characteristics of central serous chorioretinopathy patients pre date the advent of OCT imaging, with conclusive epidemiological evidence being scarce. We describe a cohort of patients presenting to a large centre over the course of a year.

Methods: Prospective data collection was undertaken for all patients diagnosed with central serous chorioretinopathy at our unit over the course of 1 year. All patients underwent thorough history taking and optical coherence tomography imaging.

Results: In total, 59 eyes from 51 patients were diagnosed with central serous chorioretinopathy between April 2017 and April 2018; 23 (45.1%) patients had optical coherence tomography evidence of complete anatomical resolution within a year, with three (5.88%) patients suffering a worse visual acuity compared with that at presentation at 1-year end point; and three patients developed secondary choroidal neovascular membranes.

Conclusion: Our study reports much-needed prospective outcomes of patients with central serous chorioretinopathy, which helps to guide clinicians when deciding treatment strategies, as well as better informing patients of their prognosis for visual improvement.

Keywords: central serous chorioretinopathy, central serous retinopathy, CSCR

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Introduction

Central serous chorioretinopathy (CSCR) is a condition defined by neurosensory retinal detachment often with concurrent retinal pigment epithelial (RPE) detachment in addition to RPE leakage and choroidal hyperpermeability evident on fluorescein angiography and indocyanine green angiography. Acute CSCR is often distressing for patients as they usually present with reduced visual acuity or positive scotomas. Most cases are said to resolve spontaneously within a few months,¹ but the recurrence rate has been reported to be as high as 50% in the majority of

cases.¹ Recurrent episodes or chronic, non-resolving disease can lead to more widespread anatomical disruption causing RPE dysfunction and visual loss. The pathogenesis of the disease remains poorly understood, but a number of risk factors have been identified.^{2–4} It is thought that choroidal vascular hyperpermeability leads to increased tissue hydrostatic pressure beneath the RPE that can eventually lead to exudation of fluid.¹ The mainstays of treatment are observation, photodynamic therapy (PDT) and laser procedures such as photocoagulation and micropulse diode.⁵ The potential role of mineralocorticoid

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Table 1. Patient demographics.

	Total	Male	Female
<i>n</i> (%)	51	35 (68.6)	16 (31.4)
Right eye	16	11	5
Left	27	19	8
Bilateral	8	5	3
Mean age (SD, range)	46.0 (11.2, 29–78)	45.3 (10.4, 29–78)	48.0 (13.1, 29–72)
Caucasian, <i>n</i> (%)	38 (74.5)	27 (52.9)	11 (21.6)
First episode	34	25	9
Recurrence	17	10	7
SD, standard deviation.			

receptor antagonists in treating CSCR has provided greater understanding of the pathogenesis,^{6,7} with recent findings suggesting that they are not efficacious in the treatment of this condition.⁸ Despite a lack of conclusive epidemiological evidence³ and only a handful of population-based surveys from the United States and Taiwan,^{9,10} CSCR is considered to be the fourth most common retinal condition. There is a paucity of prospective studies investigating the clinical course and functional outcomes of patients with CSCR. The aim of this prospective study is to define the features and outcomes of those patients presenting to our ophthalmic unit.

Methods

Prospective data collection was undertaken for all patients diagnosed with CSCR at our unit over the course of 1 year. All research has followed the tenets of the Declaration of Helsinki. The Medical Research Council guidelines do not require ethical approval as the study is not randomised or alter the treatment protocols of the patients involved. In addition, the findings are not generalisable to other populations (www.hra-decision-tools.org.uk).

New patients presented via two routes: either acutely via our emergency eye department or our optometrist-led emergency virtual macular referral system (EMAC, Manchester Royal Eye Hospital). All patients underwent thorough history taking, enquiring about specific risk factors, LogMAR visual acuity testing and slit lamp biomicroscopy,

including dilated posterior segment examination. All information was populated on a bespoke proforma. Optical coherence tomography (OCT) scanning (TOPCON 3D OCT 2000) was undertaken for all patients at presentation, looking specifically for findings consistent with CSCR. Heidelberg fluorescein angiography, ICG, FAF, OCT-enhanced depth imaging and OCT angiography were performed prior to PDT if this was chosen as a potential therapy. The presence of drusen in the treated or fellow eye was taken into consideration, along with the patient's age in order to distinguish between choroidal neovascular membranes (CNVMs) secondary to CSCR or wet ARMD. All patients were followed up for a minimum of 1 year from date of presentation. Final outcomes were recorded. Statistical analysis using descriptive statistics was carried out using Microsoft Excel software. In general, PDT was considered for patients with persistent CSCR for longer than 4 months after presentation or recurrence within 6 months of resolution.

Results

Demographics

Patient demographics are shown in Table 1.

In total, 59 eyes from 51 patients were diagnosed with CSCR between April 2017 and April 2018. All data were captured for 48 patients. Three patients did not attend their arranged follow-up appointment; 31.4% were female and 68.6% were male with a mean age of 46.0 years [standard

Table 2. Visual and anatomical outcomes.

	Total:	Male	Female
Mean presenting LogMAR VA	0.22 Range = 0.0–1.0 SD = 0.23	0.21 Range = 0.0–1.0 SD = 0.24	0.27 Range = 0.1–0.7 SD = 0.23
Mean final LogMAR VA	0.15 Range = 0.0–0.6 SD = 0.18	0.15 Range = 0.0–0.6 SD = 0.18	0.16 Range = 0.0–0.5 SD = 0.17
Complete resolution (OCT evidence)	23 (45.1%)	19 (54.2%)	4 (25.0%)
Complete resolution within 3 months	6 (11.8%)	5 (9.8%)	1 (1.96%)
Complete resolution within 6 months	14 (27.5%)	13 (25.5%)	1 (1.96%)
Complete resolution without PDT	16 (35.5%)	14 (27.5%)	2 (3.92%)
Time taken for complete resolution	6.91 Range = 1–18 SD = 5.09	5.95 Range = 1–15 SD = 4.17	11.50 Range = 2–18 SD = 7.19
Patients with worsened visual acuity after 1 year	7 (13.7%)	5 (9.80%)	2 (3.92%)
Development of secondary CNVM	3 (5.88%)	1 (1.96%)	2 (3.92%)

CNVM, choroidal neovascular membranes; OCT, optical coherence tomography; PDT, photodynamic therapy; SD, standard deviation; VA, visual acuity.

deviation (SD) = 11.2, range = 29–78 years]; 34 (66.6%) cases were new presentations of CSCR; 74.5% of patients were Caucasian, 19.6% Asian and 5.88% Afro-Caribbean.

Risk factors

Three patients reported being stressed by major life events prior to the development of visual symptoms; 10 (19.6%) patients reported either systemic or topical steroid use; 6 patients were being treated medically for hypertension; 1 patient was pregnant at the time of diagnosis; and 1 patient had a history of malignancy.

Visual and anatomical outcomes

These are shown in Table 2.

The mean LogMAR VA at presentation was 0.22 (SD = 0.23, range = 0.0–1.0), with mean final VA at last follow-up improving to 0.15 (SD = 0.18, range = 0.0–0.6); 23 (45.1%) patients had OCT

evidence of complete anatomical resolution within a year, with 3 (5.88%) patients suffering a worse visual acuity compared with that at presentation at 1-year end point. Three patients developed secondary CNVMs.

Therapeutic interventions

These are shown in Table 3.

Ten (19.6%) patients underwent PDT; three patients had worse visual acuities following treatment than at presentation and three (5.88%) patients with secondary CNVM were treated with intravitreal anti-VEGF, all of which were 60 years of age or less. No patients undergoing anti-VEGF treatment had worse visual acuities post-treatment than at presentation.

Discussion

As discussed above, CSCR is a common retinal pathology with an estimated incidence of 9.9 per

Table 3. Therapeutic interventions and visual outcomes.

	Total:	Male	Female
PDT	10	7	3
VA worse than at presentation despite PDT	3	1	2
Anti-VEGF (secondary CNV)	3	1	2
VA worse than at presentation despite anti-VEGF	0	0	0

CNV, choroidal neovascular; PDT, photodynamic therapy.

100,000 in men and 1.7 per 100,000 women.¹¹ Although it is commonly believed to be more prevalent in Asian populations, the limited available evidence appears to show comparable rates across multiple ethnic groups.^{1,11-13} There is a lack of prospective evidence within the literature on CSCR outcomes, and this study aims to address this issue. Our cohort of patients display the expected demographical characteristics of patients living within our hospital catchment area, with the vast majority being Caucasian. Although the prospective nature of this study allows for more comprehensive data collection, some patients did not attend their follow-up appointments. It is likely that their symptoms had resolved, although this cannot be assumed. It is worth highlighting that a one-year follow-up period does not permit enough time to capture recurrences of CSCR. It does, however, give adequate time for resolution of first episodes according to evidence from the current knowledge base.

Our data reflect the notion that men are three times more likely to be affected than women,¹⁴ although some studies report this can be even higher.¹¹ The median age at presentation is similar to that reported in the literature.^{11,14} In agreement with the literature,^{11,15} our data show the presenting visual acuity can be severely affected, although the vast majority of cases show only a modest reduction.^{1,11} The majority of cases from our cohort showed only unilateral subretinal fluid. It is not uncommon, however, to find subtle evidence of disease in the fellow eye when assessed on OCT scan. We found bilateral disease with subretinal fluid to occur in 15.7% at presentation, a not insignificant occurrence. Some studies from other countries suggest that the rate of bilateral pathology may be as high as 42%,¹⁴ although this study does not define their criteria for bilateral disease.

It is thought that the majority of acute CSCR cases resolve spontaneously within 3 months, with VA returning to pre-morbid function.^{5,16} Few case series exist, with one retrospective analysis from 1984 showing 57% of CSCR resolved without intervention, with a return to mean VA of almost 6/6 over 3 years.^{11,16} Although this rate appears to be similar to the findings from our study, the different imaging modalities used must be taken into account. It must be noted that this study was undertaken prior to the advent of OCT scanning, leaving significant potential for occult or subclinical CSCR to be missed. Our data suggest that although many patients do gain complete resolution at 1 year, the improvement appears to be slower than that suggested in the literature, with only a small proportion showing complete anatomical resolution at 3 months post-diagnosis (see Table 2).

PDT therapy is a promising treatment option for chronic CSCR,^{1,5,17,18} with around 10% of our patients requiring this therapy. Although this study is not designed to assess the efficacy of PDT therapy, its use in our department is fairly consistent, as detailed in the 'Methods' section. Variable outcomes can be seen from our data, with a few patients with chronic disease showing no improvement in visual function due to significant ellipsoid zone disruption and RPE damage, despite anatomical improvements. It has been suggested by other authors that there appears to be a separate, more distinct phenotype of CSCR that may be refractory to visual improvements despite anatomical resolution.¹⁹ This phenotype is said to show diffuse atrophic RPE alterations and can help guide clinicians in terms of prognosis.¹⁹ It is worth noting that the patients with improved visual acuity after PDT treatment tended to have good VAs usually around 0.1–0.3 LogMAR. Although it is also important to remember that the aim of this study is not to report PDT outcomes in such patients, this cohort does provide knowledge surrounding the numbers of patients requiring PDT when they present with CSCR.

CNVM is a well-recognised complication of CSCR,^{20,21} which results in severe visual loss.²² Although elderly patients are thought to be more susceptible,¹³ its incidence is not yet defined within the literature.^{5,11} From our data, around 6% of patients develop secondary membranes. The three patients were between 51 and 60 years of age. Two of these patients presented with recurrent CSCR. PDT has been suggested as a

better first-line therapy for chronic CSCR when compared with anti-VEGF options,^{5,23} but anti-VEGF use has been shown to be effective in cases where CNVMs develop.²⁴ Anti-VEGF was used in the patients that developed CNVM in our cohort, interestingly with no patients losing VA.

The risk factors for CSCR development are well defined. Exogenous corticosteroid use has been shown to be a significant risk factor,^{2,25,26} and in some cases, endogenous hypercortisolism can present with these findings.²⁷ Our data show one fifth of patients were using exogenous steroid therapy for medical conditions at the time of presentation. Pregnancy results in increased endogenous corticosteroids, with CSCR said to occur most commonly in the third trimester,^{28,29} usually resolving after delivery. This was the case with our patient who suffered CSCR during pregnancy. Severely stressful life events were also reported by some of the cohort. Six patients also reported systemic hypertension, all of which were under the age of 40 years old. Given that the age-specific rate of hypertension for this age group is 21.2%,³⁰ then our rate of 11.8% of presentations with hypertension is surprisingly low, especially considering the emerging role in the vascular pathophysiology. There is accumulating evidence suggesting CSCR shares the same endothelial dysfunction mechanism that is common to many cardiovascular diseases, with suggestion from within the literature that CSCR might be an indicator of systemic diseases associated with endothelial dysfunction.^{31,32} In terms of risk factors for CSCR development, our findings chime with those from the literature, although the differences in study designs make direct comparison difficult. More prospective, multicentre studies are required to accurately define the characteristics of this condition.

Conclusion

CSCR is a commonly encountered ophthalmic condition with variable outcomes. Much of the original literature fails to define specific functional and anatomical outcomes, and this prospective study aims to address this. We report the outcomes of all patients presenting to our unit within 1 year. We hope that this study will guide clinicians when deciding how and when to best proceed with therapeutic interventions as well as better informing patients in terms of their visual prognosis.

Conflict of interest statement

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