ORIGINAL PAPER DOI: 10.5603/OJ.101079

A case study of central serous chorioretinopathy with subsequent choroidal neovascularization

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ABSTRACT

BACKGROUND: In various research papers, numerous instances have been documented where central serous chorioretinopathy (CSCR) has been observed. In this particular context, we aim to share a case study about CSCR, specifically focusing on its subsequent development of choroidal neovascularization (CNV).

CASE PRESENTATION: A 51-year-old Caucasian woman was diagnosed with CSCR in her left eye by an ophthalmologist. She experienced symptoms such as blurry vision, a grey spot in the center of her vision, and reduced color saturation. The symptoms were noticed by the patient a few weeks before she visited the ophthalmologist. The best-corrected visual acuity (BCVA) was 0.63 decimal (0.22 logMAR). She was then recommended for micropulse laser treatment.

CONCLUSION: Clinicians should always consider the presence of CNV in cases of CSCR. This is because CNV can develop as a complication of CSCR, as seen in the reported case. It is important for clinicians to be vigilant for the potential occurrence of CNV in CSCR patients, especially during follow-up examinations, as timely detection and appropriate management of CNV can significantly impact the patient's visual outcomes.

KEY WORDS: CSCR; neovascularization; central; serous; chorioretinopathy

Ophthalmol J 2024; Vol. 9, 194–200

INTRODUCTION

Central serous chorioretinopathy (CSCR) is one of the most common retinopathy [1]. CSCR is a prevalent retinal disorder that primarily affects males between the ages of 20 and 50, with females typically being older than males. The reported female-to-male ratio varies from 1:2 to 1:6 [2–4]. It is characterized by acute or sub-acute central vision loss and associated symptoms such as micropsia, metamorphopsia, hyperopic shift, central scotoma, and reduced contrast sensitivity/saturation [5]. The exact pathophysiological mechanisms of CSCR are not fully understood. Still, it is believed to be linked to dysfunction of choroidal capillaries and retinal pigment, leading to serous detachment of the neurosensory retina. Recurrence of CSCR is common [6–8].

Currently, there is no "gold standard" treatment for CSCR. Observation is usually the standard of care, due to the fact that CSCR usually resolves spontaneously within 2 to 3 months [9]. There are several treatment methods, but they are not the focus of this study. For all individuals diagnosed with CSCR, the initial emphasis should be avoid-

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ing modifiable risk factors. This guidance is crucial both at diagnosis and throughout one's lifetime. Often, this involves discontinuing or refraining from the use of corticosteroids. However, when corticosteroids are necessary due to coexisting health conditions, a discussion with the patient's physician becomes essential. This discussion aims to assess the possibility of non-steroidal therapeutic alternatives, determine the lowest effective corticosteroid dosage, and explore preparations or delivery methods with minimal systemic absorption.

Additionally, addressing systemic hypertension, managing psychological stress, treating obstructive sleep apnea, resolving Helicobacter pylori infection, and discontinuing phosphodiesterase-6 inhibitors may play a role in modifying risk factors. It's worth noting that the effectiveness of these modifications in CSCR treatment is still an area requiring further research and study. Treatment should be discussed for chronic CSCR, recurrent CSCR, or monocular patients to minimise the risk of permanent visual impairment [10].

The most common issue that arises from long-term CSRCR is the development of secondary choroidal neovascularization (CNV). This secondary CNV may manifest with subretinal hemorrhage, lipid deposits, subretinal fluid (SRF), or intraretinal fluid (IRF). Approximately 24% [11] to 39% [12] of patients experience this complication, and it is predominantly of type 1 nature [11–13]. This resemblance to neovascular age-related macular degeneration can lead to confusion in diagnosis [13]. Without the presence of hemorrhage or lipid deposits, diagnosis becomes challenging, as fundus angiography often shows leakage irrespective of the neovascularization.

In such cases, optical coherence tomography angiography (OCT-A) is considered the most effective imaging method for detecting secondary CNV related to CSCR. OCT-A can identify even silent lesions in about 20% of cases [12, 14].

A helpful diagnostic test for CSCR can be indocyanine green angiography (ICGA). In different phases of ICGA, we can visualize certain characteristic phenomena. In the initial phase, we may observe delayed filling of the choroidal arteries [15, 16]. In the intermediate phase, we may notice areas of hyperfluorescence with indistinct borders and dilation of the choroidal veins [15, 17]. The changes occurring in this phase can be used to determine the treatment area for CSCR using PDT [18]. In the late examination phase, pinpoint foci of fluorescence can be seen [17]. Interestingly, the aforementioned symptoms can also be observed in approximately more than half of the fellow eyes [17].

When evaluating a study, we must also be mindful of potential pitfalls that may influence our assessments. In many centers, the examinations are performed by technicians or individuals trained explicitly for this purpose. In the vast majority of cases, these individuals conduct the examinations in accordance with established standards. However, it is always important to pay attention to technical details when assessing a study: the quality of the examination, the area covered by the study (whether it encompasses the entire macular region and the surroundings of the optic nerve head), errors arising from non-transparent optical media, and the presence of any artifacts.

Additionally, it is advisable to consider limitations resulting from possible device errors, including issues with retinal segmentation, artifacts generated

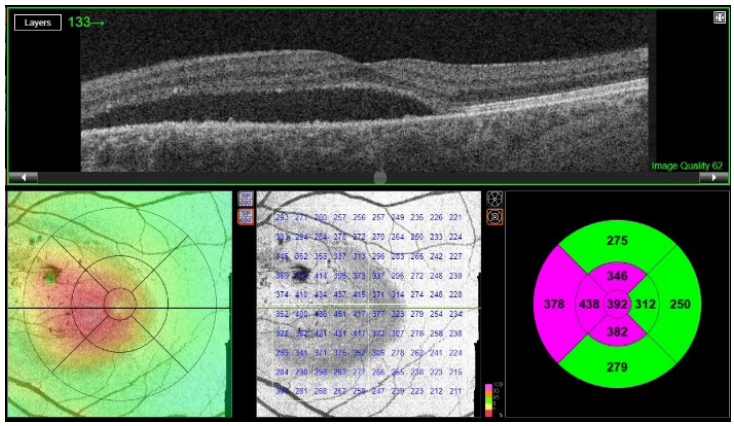

FIGURE 1. Optical coherence tomography (OCT) of the left eye before treatment

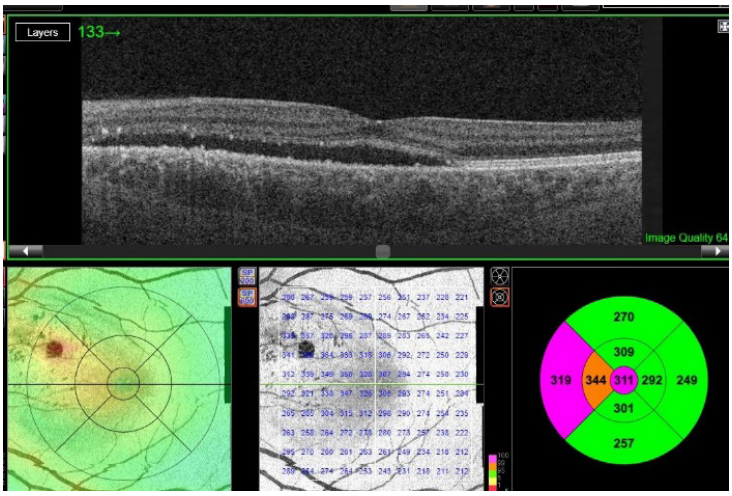

FIGURE 2. Optical coherence tomography (OCT) of the left eye after micropulse laser treatment

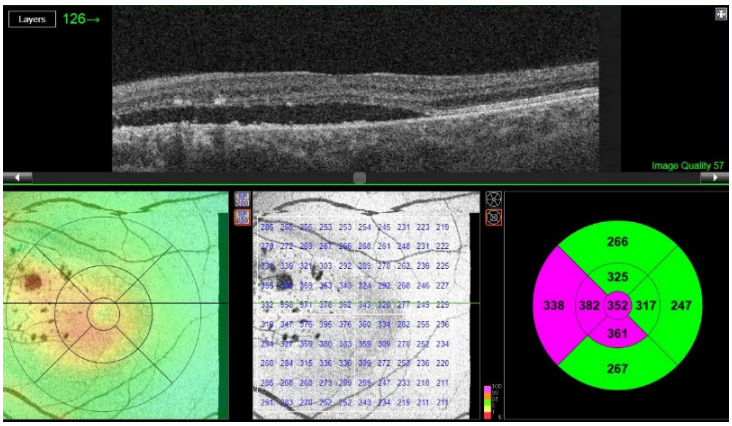

FIGURE 3. Optical coherence tomography (OCT) of the left eye — the patient reports decreased vision

by the system (the software responsible for motion control may cause unintended errors in the image, such as creating a patchwork effect known as quilting and duplicating vascular structures, errors associated with eye-tracking systems, and many others. Keeping the above in mind, in case of any doubts or discrepancies between the physical examination and optical coherence tomography angiography (OCTA) results, it is recommended that the examination be repeated. In many instances, a thorough analysis of the study will be necessary, often involving manual modification of parameters, such as automatic retinal segmentation [19].

During the diagnosis and monitoring of a patient with CSCR, we cannot overlook the examination of fluorescein angiography (FA), which has been used for decades as the "gold standard" in detecting neovascularization. Numerous studies (Bonini et al. [20]; Palewaja et al. [21]), discussed more extensively in the following discussion, indicate similar effectiveness between conventional angiography and OCTA in diagnosing potential complications. Considering the above, FA was not performed in the described case. The main reason for this patient's abstaining from FA was concerns about possible general complications. This procedure was waived because of the similar effectiveness of OCTA and conventional angiography.

CASE REPORT

A 51-year-old Caucasian female patient presented with symptoms of blurry vision, a grey spot in the central point of her vision, and reduced color saturation in her left eye. She had a medical history of hypertension, type 2 diabetes, and migraines

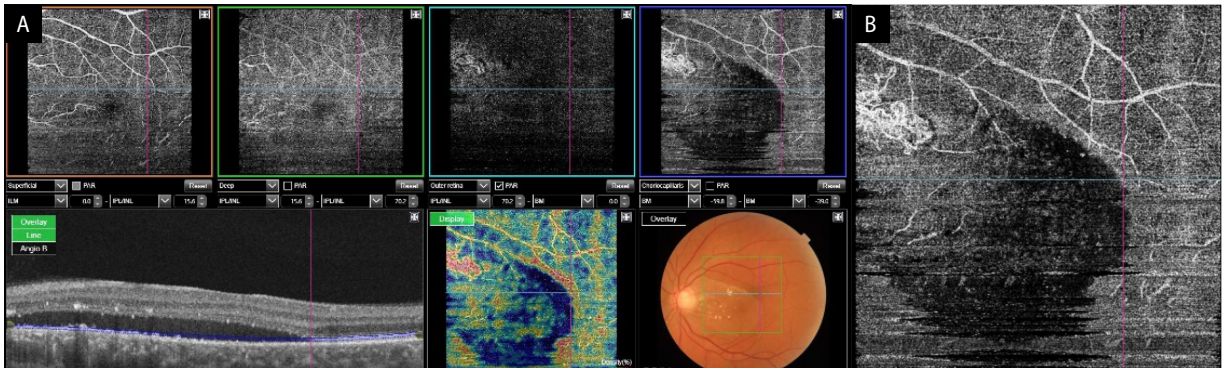

FIGURE 4. AB. Optical coherence tomography angiography (OCTA) of the left eye — the patient reports decreased vision. choroidal neovascularization (CNV) detected

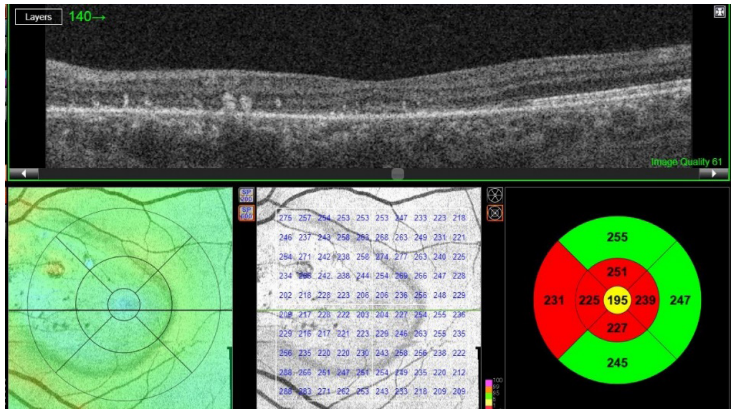

FIGURE 5. Optical coherence tomography (OCT) of the left eye 1 month after anti-vascular endothelial growth factor (anti-VEGF) injection

but had not received prior ophthalmological treatment despite using reading glasses.

Upon physical examination, the patient had a best-corrected visual acuity (BCVA) of 0.63 decimal (0.22 logMAR) in her left eye, indicating some visual impairment. Subretinal fluid and hyperopic shift were noted upon examination, suggesting the presence of CSCR. The diagnosis was confirmed through OCT (horizontal scan 7 mm × 7 mm) and OCTA (9 mm × 9 mm and 6 mm × 6 mm), which did not show any evidence of CNV. A device used for examination, diagnostics, and follow-up was DRI OCT Triton PLUS, produced by Topcon Corp.

The patient underwent micropulse laser macular treatment: a laser therapy aimed at reducing fluid accumulation in the macula.

Micropulse laser treatment entails administering brief subthreshold micropulse of laser light to the retina and retinal pigment epithelium (RPE). This approach is believed to trigger the production of intracellular biological factors that promote tissue repair, all while avoiding visible damage to the retina [22, 23]. Unlike continuous wave photocoagulation, the micropulse mode divides each laser pulse into multiple short pulses with rest intervals, enabling the tissue to cool down between pulses. This design minimizes the risk of collateral damage and tissue necrosis [23]. Additionally, the reduced thermal impact allows the treatment to be applied closer to the fovea [10]. This resulted in decreased fluid and improved BCVA to 0.8 decimal (0.1 logMAR) after the treatment. However, after three months, the patient experienced a recurrence of subretinal fluid, and laser treatment was administered again. Angio-OCT did not show any indication of CNV.

Following the second laser treatment, the patient reported improved vision and reduced fluid. However, six months later, her vision deteriorated again, with a BCVA of 0.5 decimal (0.3 logMAR) and increased subretinal fluid observed in

OCT. Angio-OCT revealed the presence of CNV (deep capillary plexus) near the optic nerve disc, a CSCR complication.

To address the CNV, the patient received an intravitreal anti-vascular endothelial growth factor (anti-VEGF) injection of bevacizumab. This medication helps suppress new blood vessel growth and reduce fluid leakage. After three weeks, the patient experienced fluid withdrawal and an improved BCVA of 0.8 decimal (0.1 logMAR).

The patient is currently under regular observation to monitor her condition and ensure there are no further complications or recurrences.

DISCUSSION

CSCR is one of the most common macula disorders, especially in younger adults [1]. CSCR should be suspected in every case of acute or sub-acute central vision loss or distortion connected with micropsia, metamorphopsia, hyperopic shift, central scotoma, and reduced contrast sensitivity/saturation, mainly with no identifiable trigger. Although there is no proven pathophysiologic mechanism, both endogenous and exogenous steroids have the most substantial known association with CSCR.

In the described patient, the disease was complicated by neovascularization. As mentioned earlier, this is a fairly common complication. However, in this particular case, the location of neovascularization is atypical — it developed near the optic nerve disc. A change in this location may go unnoticed in a standard OCTA examination that only covers the macular area. Therefore, it is important, whenever possible, to include the optic nerve disc region in the OCTA examination.

While searching for the presence of neovascularization, we must not forget about FA. FA has served as the primary method for diagnosing CNV for many years [24]. However, it is an invasive imaging technique that may lead to complications such as nausea, vomiting, and anaphylactic reactions. Furthermore, establishing a conclusive diagnosis of CNV in CSCR through FA can be difficult due to similarities in clinical presentations and imaging results [25]. Bonini et al. research indicates that OCTA demonstrates enhanced sensitivity and specificity compared to FA in identifying CNV in eyes affected by CSCR [20]. Also, Palejwala et al. [21] highlighted the utility of OCTA in the early identification of CNV. In their study, they observed that OCTA was capable of detecting early CNV (type I), a challenge with conventional FA and OCT. Nevertheless, FA remains an essential diagnostic method, and we should not overlook its significance.

Returning to the patient described, the OCTA examination, which also covered the optic disc area, allowed for the detection of neovascularization and the initiating of appropriate treatment. The patient received an injection of anti-VEGF, which reduced the lesions.

Despite this particular case, treatment with anti-VEGF in uncomplicated cases without neovascularization is not the first-line therapy. Numerous studies have been conducted to determine the role of anti-VEGF injections in cases of CSCR.

Lu et al. [26] conducted a systematic review and meta-analysis comparing two randomized controlled trials involving 64 patients with acute CSCR (symptom duration less than 3 months). The study revealed that, while there was an improvement in BCVA in the anti-VEGF group compared to the observation group at the 1-month mark [logMAR BCVA mean difference –0.07, 95% confidence interval (CI): –0.14, –0.01], this difference disappeared at the 3- and 6-month follow-ups. Central macular thickness (CMT) did not show significant differences at any time point in this study.

In another systematic review conducted by Ji et al. [27], they performed a meta-analysis of prospective comparative studies comparing anti-VEGF (bevacizumab) with observation in patients with CSCR. The findings indicated no significant difference between the two groups regarding BCVA at the 6-month follow-up for both acute and chronic CSCR. Interestingly, they observed a more substantial reduction in CMT in the observation group for acute CSCR, whereas in the anti-VEGF group, it was noted for chronic CSCR.

In the absence of consistent evidence showing a reliable benefit from intravitreal anti-VEGF therapy for CSCR, visual acuity improvement and anatomical outcomes, the routine recommendation does not include intravitreal anti-VEGF therapy for CSCR.

However, when CSCR is complicated by secondary CNV, patients experience positive outcomes from intravitreal anti-VEGF therapy, including improved visual acuity, reduced CMT, and diminished foveal serous retinal detachment [28, 29]. Despite these benefits, approximately 77% of eyes may retain some intra- or subretinal fluid after 6 months of treatment. This implies that there is a component

responsible for fluid retention that does not respond to anti-VEGF therapy [29].

CONCLUSION

The article underscores the need for acute physical examination in every patient with CSCR. By carefully assessing the patient's ocular health, clinicians can detect signs of CNV, such as subretinal fluid, retinal pigment epithelial detachment, or the classic presence of CNV membranes. Such findings should prompt further evaluation and appropriate referral to a retinal specialist for timely management.

Furthermore, the importance of proper follow-up cannot be overstated. The article advocates for regular monitoring of patients with CSCR, allowing clinicians to detect any potential progression or development of CNV. This proactive approach ensures timely intervention, maximizing the chances of preserving visual function and preventing further complications.

In conclusion, this article highlights the significance of acute physical examination and proper follow-up in patients with CSCR. By considering the presence of CNV and promptly addressing it, clinicians can optimize patient outcomes and prevent potential visual impairments. This reminds healthcare professionals to remain vigilant in their assessments and consistently prioritize patient well-being.

The strength of this study is that, to the best of our knowledge, it reports the case of CSCR followed by CNV in atypical localisation. In this case, CNV occurred near the optic nerve disc.

The main objective of this article, in addition to the necessity of regular monitoring of patients with CSCR, is to draw attention to additional diagnostic tests. In this particular case, due to the lack of patient consent, FA could not be performed. However, whenever feasible, it is advisable to conduct this examination. As mentioned above, while OCTA and FA have similar efficacy, each of these tests operates on a different mechanism, and performing both significantly reduces the possibility of overlooking CNV.

Furthermore, it is important to bear in mind potential human errors (fixation problems, poor patient cooperation, insufficiently scanned retinal area, neglecting the optic nerve disc in the examination window, overlooking artifacts, etc.) and hardware-related issues (segmentation problems, errors stemming from eye-tracking, system-generated errors, etc.) when analyzing OCTA images.

In summary, a patient with CSCR, due to the high risk for neovascularization, always requires the most detailed diagnostic approach, starting from the medical history and concluding with additional examinations (OCTA, FA).

Clinicians should always consider this. If there are any doubts about the quality or results of additional examinations or if the clinical condition is inconsistent with the results of these tests, the examinations should be repeated. In repeated examinations, efforts should be made to eliminate all possible factors influencing the quality of these tests.

This study has limitations - it reports the case of only one patient.

Availability of supporting data

The corresponding author can provide the dataset for the current case presentation upon receiving a motivated request.

Conflict of interest statement

The authors declare that they have no competing interests.

Ethics statement

Approval from the bioethics committee was not required in this case. Appropriate consent from the patient was obtained.

Author contributions

First author — M.B., second author — K.B., third author — S.C.

Acknowledgments

The authors would like to thank the technicians who performed the examinations for their valuable assistance. We also extend our gratitude to the patient for their participation and cooperation. No financial support was received for this case report.

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