

Choroidal neovascularization emerged right from the focal choroidal excavation in eyes with central serous chorioretinopathy post half-dose photodynamic therapy: A case report

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Case Report

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Abstract

Background: Focal choroidal excavation (FCE) is a common concurrent disease with central serous chorioretinopathy (CSC) and choroidal neovascularization (CNV). Photodynamic therapy (PDT), as the classic treating approach to CSC, appeared to increase the risk of CNV occurrence in eyes of CSC complicated with FCE. To observe and follow up the course development of eyes with CSC and concurrent FCE treated with half-dose photodynamic therapy (PDT).

Case presentation: In this case report analysis, two eyes with CSC and concurrent FCE, treated with half-dose PDT were followed up with monthly retinal fundus examinations. Best corrected visual acuity (BCVA) and ophthalmic fundus examination, including fundus photos, optical coherence tomography (OCT) and angiography. In case 1, a 46 year-old female has been diagnosed as CSC and concurrent FCE. The baseline BCVA was 10/20. Post half-dose PDT, complete resolution of SRF was achieved at one-month with stable BCVA. At three months, the patient complaint of obvious metamorphosis. Multimodal images confirmed the existence of CNV, derived from the FCE, inside the zone of PDT irradiation. The development of CNV ceased promptly one month post the injection of ranibizumab. In case 2, a 39 year-old male was diagnosed as bilateral CSC. The BCVA was 8/20 (od), and 16/20 (os). The multimodal images showed classic CSC manifestation in left eye, but atypical manifestation in right eye with subtle SRF and FCE. Post half-dose treatment, the SRF in left eye completely resolved at three-months, and the BCVA improved to 24/20. However, a lesion of CNV grew in FCE at one month in right eye, with decreased BCVA, 4/20. One month post-injection, apparent regression was witnessed, with improved BCVA, 6/20. The CNV proceeded to be a scar at two-month. The BCVA maintained at 8/20.

Conclusions: In this study, CNV was induced in two cases of CSC concurrent with FCE post half-dose PDT. The CNV grew right from FCE, inside the zone of PDT irradiation. Although half-dose PDT has proved to be safe in treating CSC, it appeared to increase the risk of CNV occurrence in eyes of CSC complicated with FCE.

Background

Since the new entity - focal choroidal excavation (FCE) raised by Jampol in 2006[1], its nature has always been a mystery. Some authors once thought FCE changed little over time [2, 3], while more currently reported FCE companied with or progressed to chorioretinopathy in observation period [4-6]. Several studies reported the prevalence of FCE in central serous chorioretinopathy (CSC) and found FCE is not uncommon [7]. Multi-modal images disclosed aberrant choroidal circulation underlying the FCE, which were also typical in CSC [8]. Photodynamic therapy (PDT) for CSC complicated by FCE can achieve favorable effects [5]. The choroidal neovascularization (CNV) also was a common concurrent disease with FCE. Several studies reported CNV grew in eyes with FCE during follow-up [4]. In this article, we

reported two cases of eyes with CSC and concurrent FCE developed CNV, after half-dose PDT. And it is noted that the safety profile of half-dose PDT should be tested in cases of CSC and FCE.

Case Presentation

Case 1

A 46 year-old Chinese female patient presented with 5 months of central scotoma in her right eye, without prodromic symptoms. There were no histories of traumatic, systematic illnesses, or the family history of eye disorders. Visual acuity of the suffered eye can be corrected from 8/20 to 10/20. The anterior segment and vitreous were normal. The fundus photo (Topcon TRC50LX; Topcon, Tokyo, Japan) results showed atypical pigmentary alterations and local serous detachment involved the central fovea (figure 1). The optical coherence tomography (OCT, Heidelberg Engineering, Heidelberg, Germany) revealed the persistent sub-retinal fluid (SRF), and FCE (figure 1). This patient had been diagnosed as CSC two months before and given the order for observation, but no visual benefits occurred until this visit. The fluorescent angiograph (FA) displayed typical inkblot leakage of classic CSC. Given the symptom durations that lasted for more than 3 months, half-dose photodynamic therapy (PDT) was chosen to cease the development of the disease. After obtaining written informed consent, half-dose (3 mg/m²) PDT (Opal Photoactivator; Lumenis, Beijing, China) was performed as standard protocol[9], with a spot size for 2500 μm covering the leaking sites juxta-fovea involved the FCE. One month post-treatment, the best-corrected visual acuity (BCVA) was 10/20. The OCT presented the complete resolution of SRF. At three-month, the patient complaint of obvious metamorphosis, but the BCVA result was stable. The fundus photo showed sub-macular hemorrhage and a round hypopigmentary site inferior-nasal to the fovea. The OCT revealed, right in FCE, a lesion of CNV broke through the retinal pigment epithelium (RPE), companied with SRF, hemorrhage and limited retinal edema. The FA confirmed the occurrence of CNV. Promptly, the patient received intravitreal injection of anti-vascular epithelial growth factor (VEGF) - ranibizumab 0.5 mg. One month post-injection, the CNV promptly proceeded to be a scar precisely at the sites of FCE, presented as RPE elevation with hyper-reflective material. Only the area nasal to the scar there laid a little residue FCE. Both the BCVA and metamorphosis did not change. No obvious changes occurred at the 3 months post-injection.

Case 2

A 39 year-old Chinese male patient presented with 6 months of visual loss in both eyes (figure 2, 3). There were no histories of traumatic, systematic illnesses, or the family history of eye disorders. The BCVA was 8/20 (od), and 16/20 (os). The fundus findings were pigment alteration inferior-temporal to the fovea (od) and serous retinal detachment involved the macular (os). The OCT in left eye showed SRF. The mid-phase angiography showed multi-focal leaking spots in FA and correspondingly hyperfluorescence in indocyanine green angiography (ICGA) (figure 2). The OCT in right eye showed subtle SRF with FCE. The mid-phase angiography showed suspicious leaking spot inferior to the fovea in FA and correspondingly hyperfluorescence in ICGA (figure 3). Given the manifestations and durations, bilateral chronic CSC was

diagnosed. After obtaining written informed consent, half-dose PDT was operated with spot size of 3500 μ m (od) and 5400 μ m (os). The spot in right eye covered the FCE. The SRF in left eye partly resolved at one-month, and completely resolved at three-month. The angiography in left eye presented without active leaking. The BCVA (os) improved to 20/20 at one month, 24/20 at three-month, and remained stable to the six-month. Unexpectedly, the recovery of his right eye did not go well. At one month, the patient complaint of further visual loss in right eye. The fundus examination showed serous retinal detachment and subretinal hemorrhage. The OCT showed CNV emerged, passed through RPE, leading to fluid and hemorrhage accumulated. The CNV blurred the existence of FCE. The BCVA declined to 4/20. The patient received intravitreal injection of 0.5 mg ranibizumab, immediately. One month post-injection, apparent regression of CNV and SRF was witnessed on OCT and fundus photo. The BCVA improved to 6/20. Two months later, the CNV proceeded to be a scar. The BCVA returned to baseline, 8/20. Five months post injection, OCT and angiography confirmed the stabilization of CNV. The BCVA maintained at 8/20.

Discussion And Conclusion

In this article, we observed two cases of CSC with FCE treated by widely-accepted half-dose PDT, while both cases, instead of regression, developed CNV through RPE. In case 1, the FA showed typical inkblot fluorescence leaking, while OCT showed SRF and concurrent FCE. And one month post PDT, the SRF completely resolved. The regression before two months was indeed in accordance with general regression of CSC after half-dose PDT.

In right eye of case 2, the OCT presented with negligible amount of SRF and FCE at baseline, and the golden standard angiography showed suspicious leaking in FA and corresponding hyperfluorescence in ICGA, seemingly in accordance with chronic CSC. Based on the multimodal results and the classic manifestation in the fellow eye, it was difficult to judge whether it was CSC with FCE, or just a non-conforming typed FCE.

Put aside the bias in diagnosis, PDT, as the only intervention, appeared to be partly accounted for the secondary CNV development. In both cases, the FCE was involved in PDT irradiation and the CNV grew right from the FCE. Furthermore, the sign of ischemia in FA (fig 1h) was obvious. The OCT also showed choroidal thickness reduced. It is known that the primary effect of PDT seems to influence choriocapillary perfusion [10, 11]. Reduced-dose modification was raised, based on lower incidence of side effects [12]. Chances are that reduced dosage in verteporfin still induced or even aggravated ischemia under stress [13]. The unexpected emerge of CNV make the treatment switch to anti-VEGF therapy. Fortunately, half-dose PDT induced CNV responded well to anti-VEGF.

The mainly limitation was sporadic cases report, that was not strong to reach to a general conclusion in most cases. The low incidences of FCE make it impossible to accumulate enough cases to accomplish a convincing clinical trial. However, we first prospectively followed up the whole process of two cases from FCE with CSC, to CNV and eventually to lesion scar in this study.

In this study, we observed type CNV was induced in two cases of CSC concurrent with FCE post half-dose PDT. The CNV grew right from FCE, inside the zone of PDT irradiation, but regressed rapidly after only one injection of ranibizumab. Although half-dose PDT has proved to be safe in treating CSC, it appeared to increase the risk of CNV occurrence in eyes of CSC complicated with FCE.

Declarations

Ethics approval and consent to participate

This study followed the rules Declaration of Helsinki. Written informed consent was obtained from the two patients

Consent to publish

Consent to be published was obtained from both patients in this article.

Availability of data and material

All data have been presented within the manuscript and in the form of images.

Competing interests

The authors declare that they have no conflict of interest.

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Authors' contributions

YL and LL reviewed the literature and drafted the manuscript. XW and MZ participated in the collection of clinical information and critically revised the article. LL and GZX performed the PDT and intravitreal injection, respectively. All authors gave final approval of the version to be published.

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Figures

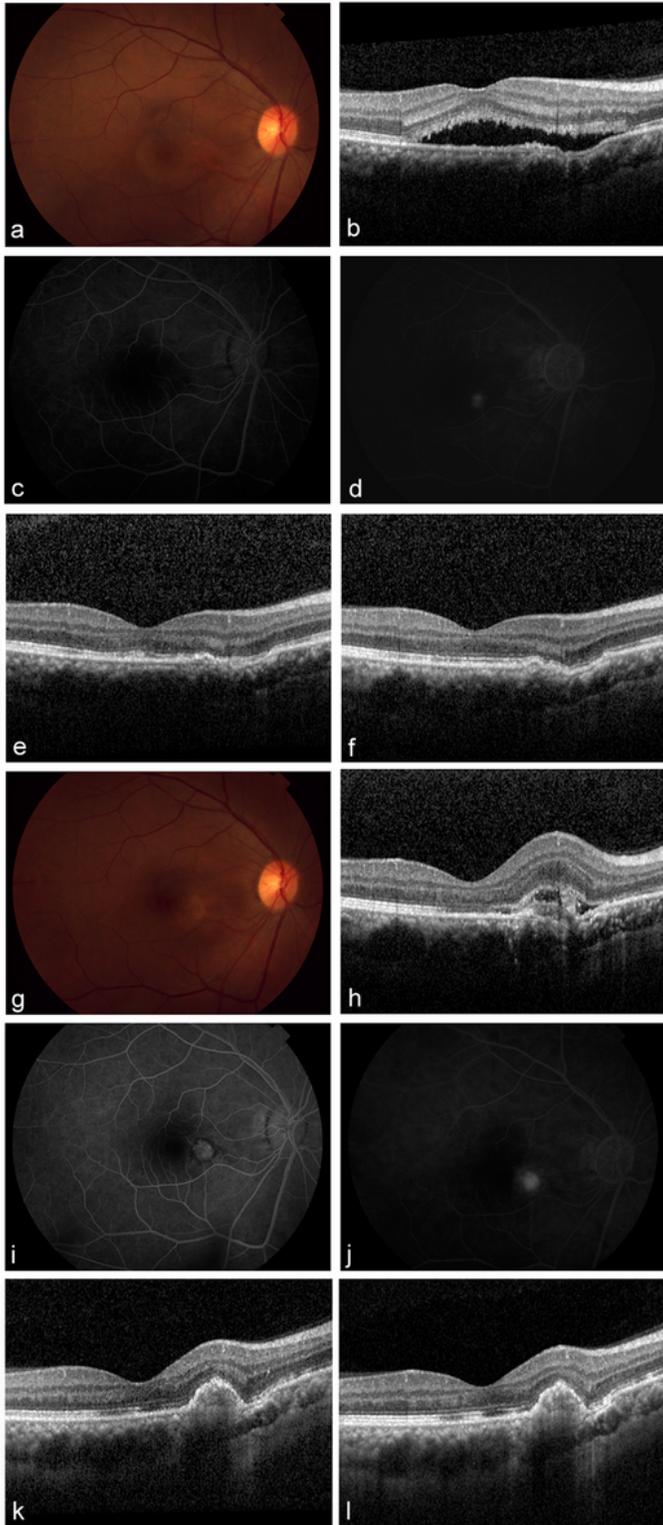


Figure 1

The multimodal images of case 1, a 46 year-old Chinese female with CSC and FCE. a. at baseline, the fundus showed serous detachment and depigmentation zone nasal to it at the macular. b. The OCT presented with SRF and FCE. The region temporal to FCE presented with flat irregular pigment epithelial detachment (PED). The choroidal thickness (CT) on fovea and underlying FCE was 338 μm and 202 μm . c, d. The FA from early phase to the middle showed classic inkblot leakage. e. One month post-PDT, the OCT presented with complete resolution of SRF and RPE decompensation underlying FCE. The CT on fovea and underlying FCE was 315 μm and 183 μm . f. At two months, the reflection of RPE on OCT became clear. The CT on fovea and underlying FCE was 285 μm and 168 μm . G. At three months, the fundus presented with macular edema and still existed hypopigmentation zone. h. The OCT presented with a new lesion of CNV through RPE/Bruch complex and sub-retinal fluid. The CT on fovea and underlying FCE was 289 μm and 175 μm . i. The early phase FA showed "lacy" hypofluorescence around slightly-hyperfluorescence areas. j. The middle phase FA showed the obvious but focal fluorescence leaking in CNV lesion. k. One month post intravitreal injection, the OCT presented with RPE elevation with hyperreflective material in once CNV lesion, and only a little residue FCE nasal to the scar. The CT on fovea and underlying FCE was 282 μm and 172 μm . l. Two months post injection, the OCT images presented little changes, compared with last visit. The CT on fovea and underlying FCE was 280 μm and 171 μm . The best corrected visual acuity (BCVA) was 10/20 throughout the whole follow-up.

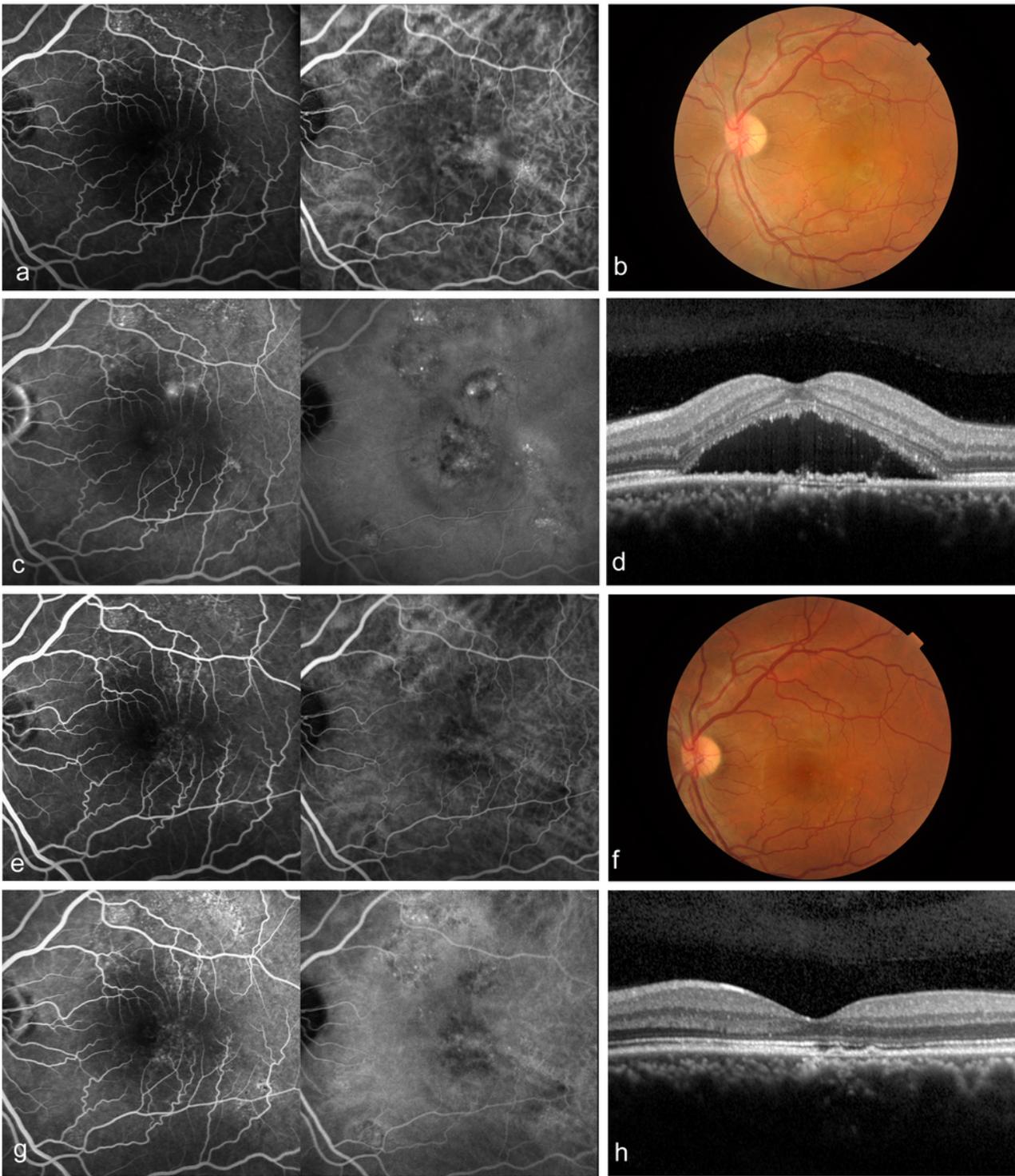


Figure 2

The multimodal images of case 2, a 38 year-old Chinese male patient with CSC in his left eye. a. The early phase angiography showed widespread hyperfluorescence in FA and choriocapillary dilation in ICGA. b. The fundus photo displayed with tortured vessels and oval serous retinal detachment at the fovea. c. In middle phase, it presented with fluorescence leaking in FA and hyperfluorescence in corresponding zone in ICGA. d. The OCT showed SRF and limited RPE decompensation. the best corrected visual acuity

(BCVA) was 16/20. e, Six months post-treatment, the early phase angiography showed window defects in FA, and choriocapillary dilation in ICGA. g. the mid-phase angiography showed no active leakage. f, h. The fundus photo and OCT showed the disappearance of SRF. The BCVA improved to 24/20.

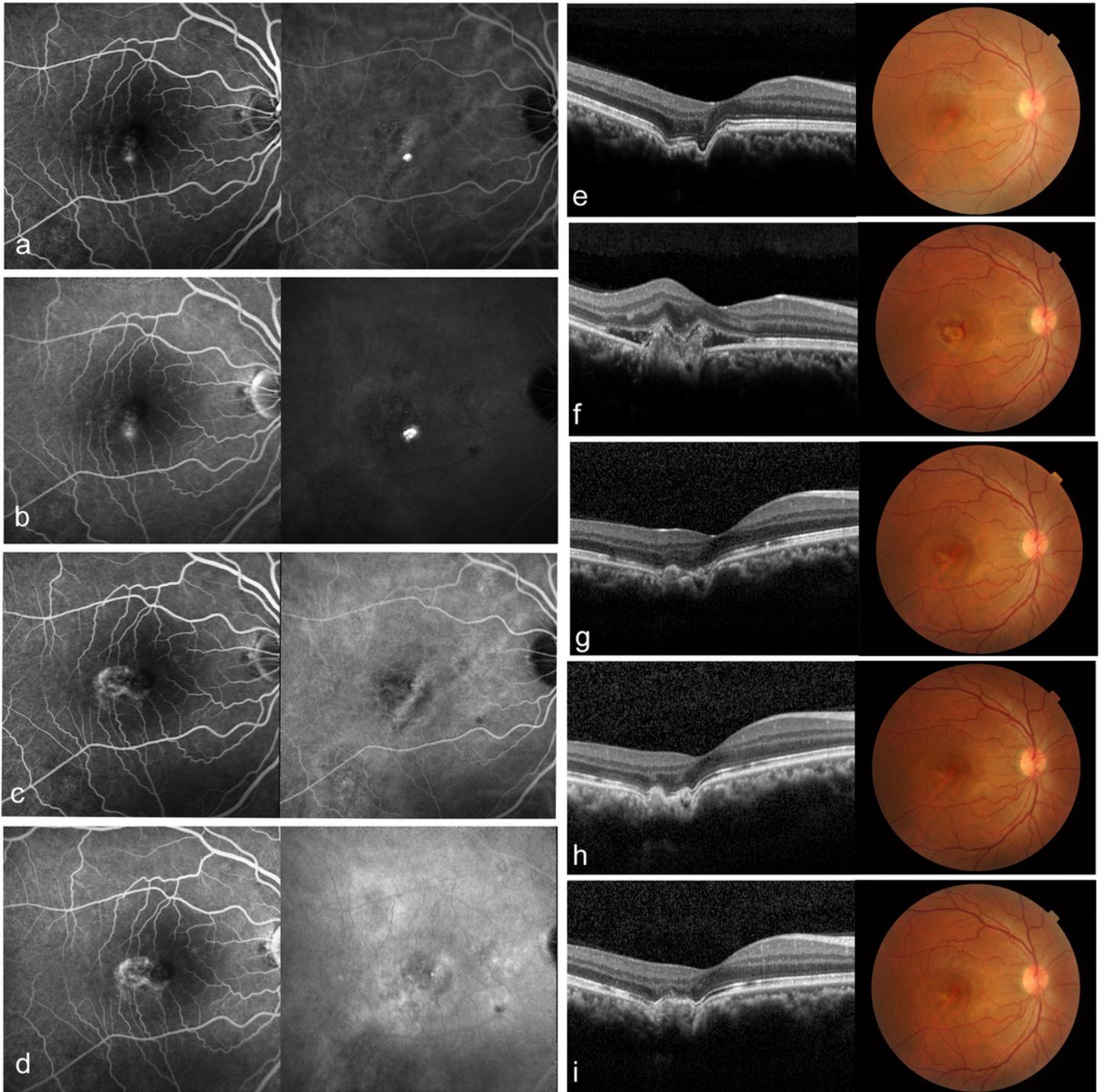


Figure 3

The multimodal images of case 2, a 38 year-old male with CSC and FCE in his right eye. a. The early phase angiography showed focal hyperfluorescence at the fovea in FA (left) and choriocapillary dilation and limited hypofluorescence in FCE in ICGA (right). b. In middle phase. FA (left) showed suspicious

leaking on fovea. ICGA (right) showed hyperfluorescence in corresponding zone, and no obvious fluorescence abnormality was found in FCE. e. The OCT presented with subtle SRF and FCE, corresponding to the fundus finding. The best corrected visual acuity (BCVA) was 8/20. f. One month post-PDT, the OCT showed CNV breaking through RPE, causing fluid accumulating sub-retina, and the fundus photo showed subretinal hemorrhage in round SRD zone. The BCVA was 4/20. g. One month post ranibizumab injection, the OCT showed the disappearance of CNV which corresponded to the oval zone with cross lesion in fundus finding. The BCVA was 6/20. h. At two months, the lesion developed to be a scar. The BCVA was 8/20. c, d. At five month post injection, the angiograph showed window defect hyperfluorescence in FA (left) and choriocapillary dilation in ICGA (right). i, The OCT showed two residue FCE round the CNV scar, corresponding to a cross lesion in fundus finding. The BCVA maintained at 8/20.

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