• Letter to the Editor •

Management of perifoveal exudative vascular anomalous complex with laser treatment: a case report

Qing Chen[1,2], *Bin-Jian Wang*[1,2], *Yu-Zhu Gao*[1,2,3], *Xue Wu*[1,2,3], *Ming Zhang*[1]

[1]Department of Ophthalmology, West China Hospital, Sichuan University, Chengdu 610041, Sichuan Province, China
[2]Department of Ophthalmology, West China School of Medicine, Sichuan University, Chengdu 610041, Sichuan Province, China
[3]Department of Ophthalmology and Research Laboratory of Ophthalmology, West China Hospital, Sichuan University, Chengdu 610041, Sichuan Province, China
Co-first Authors: Qing Chen and Bin-Jian Wang
Correspondence to: Ming Zhang. Department of Ophthalmology, West China Hospital, Sichuan University, Chengdu 610041, Sichuan Province, China. zhangmingscu0905@163.com
Received: 2024-05-18 Accepted: 2024-12-10

DOI:10.18240/ijo.2025.05.25

Citation: Chen Q, Wang BJ, Gao YZ, Wu X, Zhang M. Management of perifoveal exudative vascular anomalous complex with laser treatment: a case report. *Int J Ophthalmol* 2025;18(5):965-968

Dear Editor,

We describe a case diagnosed with exudative perifoveal vascular anomalous complex (ePVAC) successfully treated with focal laser photocoagulation (577 nm), achieving a favorable prognosis with best-corrected visual acuity (BCVA) of 20/20. Additionally, we discussed the identification of a possible early-onset non-ePVAC. The ePVAC is characterized as an isolated, aneurysmal abnormity near the macula and usually accompanied by cystic macular edema (ME)[1-2]. Currently, there is no definitive consensus regarding the treatment of ePVAC. This case suggested that retinal laser photocoagulation could be considered a suitable method for ePVAC therapy[3].

CASE REPORT

Ethical Approval This study was approved by the Ethics Committee on Biomedical Research, West China Hospital of Sichuan University (2024, No.1408) and it followed the tenets of the Declaration of Helsinki. Informed consent was obtained from the patient for publication of this case report and any accompanying images.

A 63-year-old male came to retina department complaining about decreased vision for 2mo in his right eye and reported the history of gout for 5y and hypertension for 1y, both well-controlled with medication. At baseline, his BCVA was 20/50 in the right eye and 20/20 in the left eye, no abnormality in the anterior segments of both eyes except mild cataracts and with normal intraocular pressure. The fundus examination of the left eye showed no obvious abnormality. However, fundus examination and wild field scanning laser ophthalmoscopy (SLO) of the right eye illustrated one isolated parafoveal off-white lesion associated with hard exudates and small microaneurysm (Figure 1A). Swept-source optical coherence tomography (SS-OCT) and SS-OCT angiography (SS-OCTA) images revealed ME and one round dark lumen with a hyperreflective oval wall between the inner nuclear layer (INL) and the outer plexus layer (OPL; Figure 1B-1C), as well as dilated superficial blood vessels and detectable internal flow within intraretinal aneurysmal lesion (Figure 1D). In addition, an isolated lesion with well-defined hyperfluorescence and leakage near the macula was observed on fluorescein fundus angiography (FFA; Figure 1E-1F).

Consequently, this patient was diagnosed with ePVAC and accepted two sessions of continuous wave 577 nm yellow laser (IQ 577® Laser, IRIDEX 1212 Terra Bella Avenue Mountain View, CA 94043, USA). The first session was performed with the following parameters: 100 mW power, pluse duration of 100ms and a spot size of 100 μm. Three shots were performed on the aneurysmal lesion repeatedly, targeting the major leakage point until the lesion exhibited whitening. Nevertheless, after 1mo of the initial laser treatment, the edema and exudation persisted, and BCVA decreased to 25/100. The disease is still progressing (Figure 1G-1K).

Subsequently, the second session of laser therapy was applied (3 shots, 200 mW power, 100ms duration and a spot size of 100 μm). After laser treatment, the retina of the lesion presented a faint, greyish-white discoloration. One month later, the BCVA was improved to 20/50, and the aneurysmal lesion with hard exudates and intraretinal hemorrhage was decreased in size (Figure 1L). In addition, the enface image illustrated that the lesion had become limited surrounding with hyper-reflex dots; the B-scan image showed the resolution of oval lesion (Figure 1M-1N). Furthermore, SS-OCTA showed

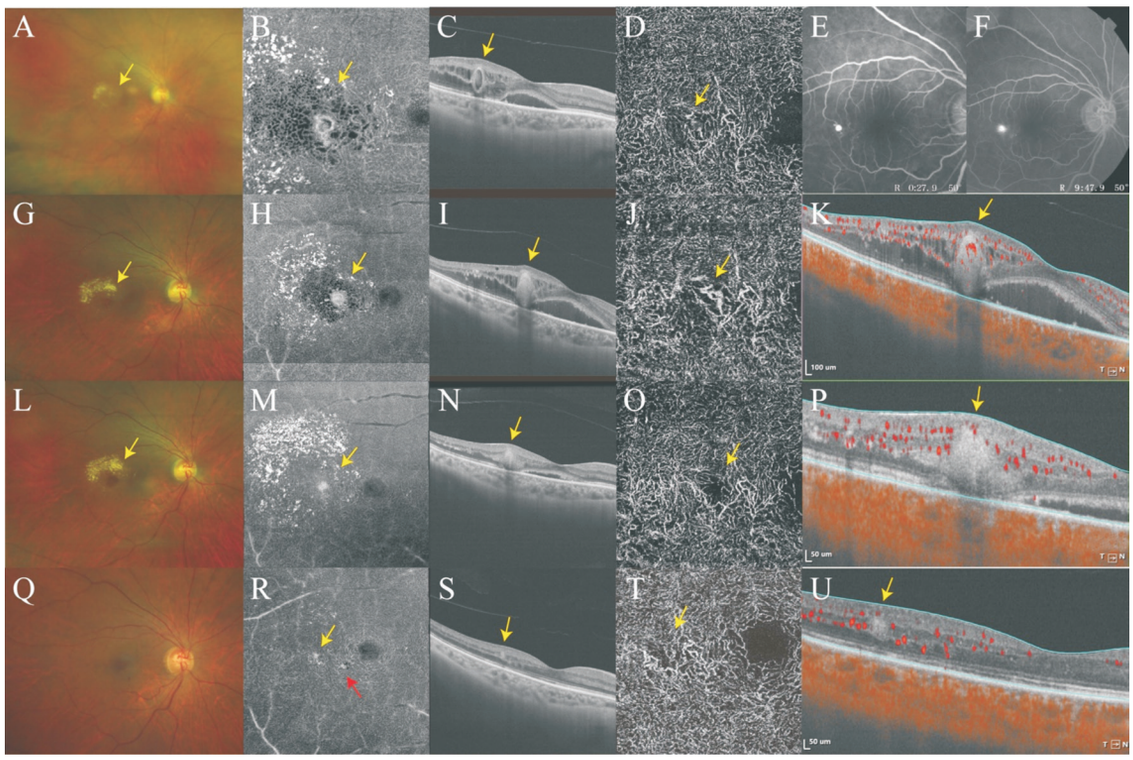

Figure 1 Multi-modal retinal imaging at initial diagnosis and follow-up A: Wild field SLO of the right eye illustrated an aneurysmal abnormity in the perifoveal region. B-C: SS-OCT showed a round dark aneurysm (diameter, 270 μm); the enface image showed the isolate lesion were hyper-reflex outside with sparse blood vessels and some hyper-reflex dots surrounding; the B-scan image showed an oval shape with discontinued ellipsoid zone, combined with intraretinal fluid, subretinal fluid and ME with 359 μm of CMT. D: SS-OCTA showed the oval lesion was located mainly in DCP with telangiectasis in the macular region in retina and irregular arrangement of microvasculature in DCP. E-F: FFA showed a hyperfluorescent aneurysmal abnormity with leakage in later stage, with telangiectasis in the macular region, a small non-perfusion area in the infratemporal part of the peripheral retina and sporadic microaneurysms; G-K: 1mo after the first laser treatment. G: Wild field SLO of the right eye showed a bulged-aneurysmal lesion with hard exudates and intraretinal hemorrhage. H-I: SS-OCT. The enface image showed there were still some hyper-reflex dots surrounding the lesion, with sparse blood vessels; the B-scan image showed there was still an oval lesion (diameter, 423 μm) with ME (CMT: 436 μm). J-K: SS-OCTA showed that there was still an oval lesion, with telangiectasis in the macular region and irregular arrangement of microvasculature in DCP, and detectable internal flow within the lesion. L-P: 1mo after the second laser treatment. L: Wild field SLO of the right eye showed the aneurysmal lesion with hard exudates. M-N: SS-OCT. The enface image showed the limited lesion had surrounding with hyper-reflex dots; the B-scan image showed the resolution of oval abnormity and involution of leakage (intraretinal fluid had been replaced by some exudates, subretinal fluid had been absorbed partially; CMT: 264 μm); O-P: SS-OCTA showed the sparse deep capillaries plexus at the lesion located. Q-U: 2y after the second laser treatment. Q: Wild field SLO of the right eye showed the lesion was no more visible. R-S: SS-OCT showed the smaller and localized lesion, with visible residual scarring, and the CMT was 239 μm. T-U: SS-OCTA showed still the sparse deep capillaries plexus, and no significant abnormal flow signal at the lesion located. Yellow arrow corresponds to the lesion and related pathological changes, while the red arrow indicates to non-ePVAC. SLO: Scanning laser ophthalmoscopy; FFA: Fluorescein fundus angiography; SS-OCT: Swept-source optical coherence tomography; SS-OCTA: Swept-source optical coherence tomography angiography; ME: Macular edema; CMT: Mean central macular thickness; DCP: Deep capillaries plexus; ePVAC: Exudative perifoveal vascular anomalous complex.

the sparse deep capillary plexus at the lesion site, while the microvasculature structure surrounding the lesion started to recover (Figure 1O-1P).

Twenty-three months after the second session of laser therapy, the BCVA was improved to 20/20, and the lesion became smaller and localized on SLO slabs (Figure 1Q) without recurrence of ME. However, there was some residual disruption of ellipsoid zone and disorganization of the retinal photoreceptor layer structure (Figure 1R-1S). The sparse deep capillaries plexus (DCP) network was found on SS-OCTA images (Figure 1T-1U).

Notably, the aneurysm-like lesion adjacent to the ePVAC lesion has enlarged compared with previous visits, the enrface image showed an enlarged aneurysm-like lesion adjacent to the original ePVAC lesion, with sparse blood vessels. And the SS-OCT B-scan reveals an elliptical lesion with a high-reflective wall between the INL and OPL, absent of ME and any exudations (Figure 2). Above all, good visual prognosis

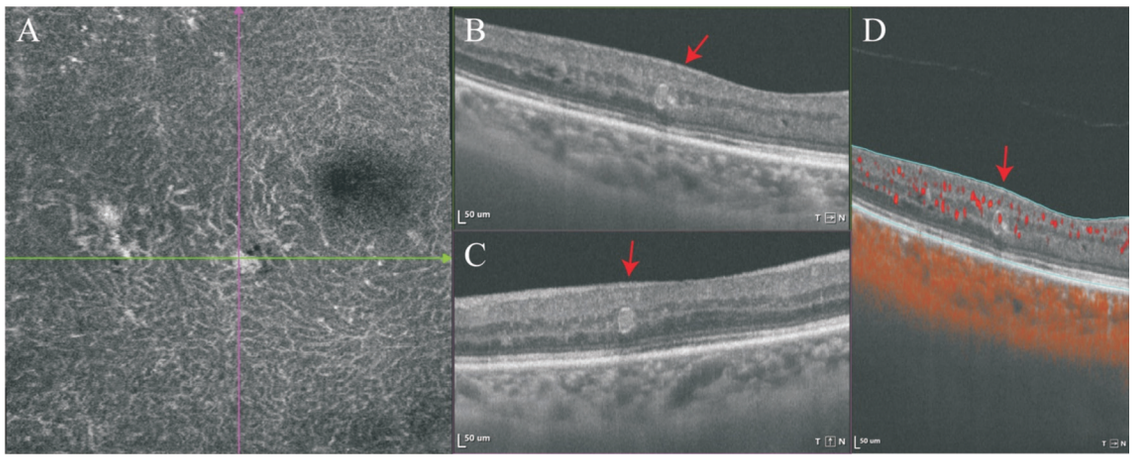

Figure 2 Multi-modal retinal imaging of non-ePVAC A: The enFace imaging showed an aneurysm-like lesion; B-C: The B-scan reveals an elliptical lesion with a high-reflective wall; D: Swept-source optical coherence tomography angiography (SS-OCTA) showed the significant abnormal flow signal at the lesion located. The red arrow highlights the non-ePVAC. Non-ePVAC: Non-exudative perifoveal vascular anomalous complex.

after the second laser therapy was confirmed.

DISCUSSION

The ePVAC is a relatively rare and new entity first described by Querques *et al*[1]. Based on the presence of exudation, perifoveal exudative vascular anomalous complex is classified into ePVAC and non-ePVAC according to Sacconi *et al*[4]. The pathophysiological mechanisms of ePVAC remain unclear, posing significant challenges to disease management.

With multimodal imaging, ePVAC, located close to the macula and usually accompanied by cystic ME, appears as an isolated aneurysmal lesion, which is usually characterized by a round hyperreflective lesion with cystic spaces between OPL and INL on optical coherence tomography (OCT) and with flow signal within a well-defined perifoveal aneurysmal on OCT angiography (OCTA)[1-2,5-6]. These lesions are displayed as an aneurysm with leakage on FFA[2,7-8]. Recently, multimodal ophthalmic imaging techniques have expanded our knowledge about retinal disease, such as SS-OCT, which also facilitated in the disease diagnosis and management of ePVAC.

At present, there is no consensus on the treatment for ePVAC. Some previous studies have suggested observation. Kim *et al*[7] and Sacconi *et al*[4] observed the spontaneously regression of lesions. In addition, some researchers described anti-vascular endothelial growth factor (VEGF) therapy for patients with ePVAC. In these studies, the majority of patients did not achieve a good prognosis after receiving anti-VEGF treatment, even in Zhang *et al*'s[9] study, one patient's conditions worsened after 2 intravitreal injections of aflibercept[1-2,7]. Some evidences suggested that ePVAC may result in retinal vascular endothelial cell injury without retinal inflammation or ischemia[1-2], which may be an explanation of poor response to anti-VEGF therapy in patients with ePVAC. Instead of intravitreal anti-VEGF drugs, laser photocoagulation is considered a more suitable method for ePVAC therapy, especially when exudation occurs[10]. In previous cases, laser therapy was used on the aneurysm in eight cases, with the 577 nm laser being used in three of them[5,8,11-12], and the other laser modalities used for ePVAC were also discussed by Arruabarrena *et al*[3]. With no recurrence in almost all cases, Mrejen *et al*[8] reported an edema recurrence after 7mo, but the result of the initial laser therapy was not explained. The coagulation effect of the laser is thought to lead to the elimination of the complex and leakage of the aneurysm lesion and laser photocoagulation has emerged as a repeatable, inexpensive and minimally damaging treatment[13]. Notably, the laser was conducted merely around the ePVAC lesion, avoiding direct treatment of the fovea.

In this report, we described an ePVAC case with successful laser treatment. Twenty-three months after the second session of laser therapy, the BCVA was improved to 20/20 with occurrence of a possible non-ePVAC lesion. The non-ePVAC is considered to be a subclinical pre-exudative stage of ePVAC according to Sacconi *et al*[4], indicating the necessity of longer follow-up for management and understand the progression of non-ePVAC. Our current case report indicates that the yellow laser (577 nm) is effective in treatment for ePVAC, which is consistent with Arruabarrena *et al*[3], who suggested the 577 nm yellow laser may be more indicated for parafoveal lesions because it has low absorption by the xanthophyll pigment and less scattering.

In conclusion, laser therapy may be an appropriate and effective treatment for ePVAC. Multimodal ophthalmic imaging, especially the SS-OCT and SSOCTA, could help in diagnosis and management of ePVAC and subclinical non-ePVAC. Further research is still needed to explore the

pathophysiological mechanisms underlying ePVAC and search for effective treatment strategies.

ACKNOWLEDGEMENTS

Authors' Contributions: Chen Q: Data collection, initial analysis and manuscript writing; Wang BJ: Data collection and manuscript writing; Gao YZ: Data collection and assistance with manuscript writing; Wu X: Data collection and assistance with manuscript writing; Zhang M: Project development and assistance with manuscript preparation.

Foundations: Supported by the 1.3.5 Project of West China Hospital of Sichuan University (No.2023HXFH043); Sichuan Natural Science Foundation (No.24NSFSC1718).

Conflicts of Interest: Chen Q, None; **Wang BJ,** None; **Gao YZ,** None; **Wu X,** None; **Zhang M,** None.

REFERENCES

1 Querques G, Kuhn D, Massamba N, *et al*. Perifoveal exudative vascular anomalous complex. *J Fr Ophtalmol* 2011;34(8):559.e1-559.e4.

2 Sacconi R, Freund KB, Yannuzzi LA, *et al*. The expanded spectrum of perifoveal exudative vascular anomalous complex. *Am J Ophthalmol* 2017;184:137-146.

3 Arruabarrena C, Liaño G, Hernáez-Leonato JM, *et al*. Selective focal laser therapy as the primary treatment for exudative perifoveal vascular anomalous complex (ePVAC): case series and literature review. *Ophthalmic Surg Lasers Imaging Retina* 2023;54(1):43-49.

4 Sacconi R, Borrelli E, Sadda S, *et al*. Nonexudative perifoveal vascular anomalous complex: the subclinical stage of perifoveal exudative vascular anomalous complex? *Am J Ophthalmol* 2020;218:59-67.

5 Remolí-Sargues L, Montero-Hernández J, Monferrer Adsuara C, *et al*. Perifoveal exudative vascular anomalous complex treated with navigated retina laser. *J Fr Ophtalmol* 2022;45(1):e9-e11.

6 Banda HK, Dang SB, Rothman RJ. Perifoveal exudative vascular anomalous complex with suspended scattered particles in motion. *Ophthalmic Surg Lasers Imaging Retina* 2019;50(12):796-800.

7 Kim JH, Kim JW, Kim CG, *et al*. Characteristics of perifoveal exudative vascular anomalous complex in Korean patients. *Semin Ophthalmol* 2019;34(5):353-358.

8 Mrejen S, Le HM, Nghiem-Buffet S, *et al*. Insights into perifoveal exudative vascular anomalous complex. *Retina* 2020;40(1):80-86.

9 Zhang ZW, Xu LP, Wu ZF, *et al*. Case report: perifoveal exudative vascular anomalous complex in a Chinese patient with diabetes mellitus. *Optom Vis Sci* 2019;96(7):531-535.

10 Corvi F, Corradetti G, Juhn A, *et al*. Long-term follow-up of perifoveal exudative vascular anomalous complex treated with intravitreal injections of anti-vascular endothelial growth factor and thermal laser photocoagulation. *Am J Ophthalmol Case Rep* 2020;20:100883.

11 Ayachit AG, Sacconi R, Ayachit GS, *et al*. Perifoveal exudative vascular anomalous complex-like lesion as a complication of prepapillary arterial loops. *Ophthalmic Surg Lasers Imaging Retina* 2018;49(12):974-978.

12 Henriques J, Pinto F, Rosa PC, *et al*. Continuous wave milipulse yellow laser treatment for perifoveal exudative vascular anomalous complex-like lesion: a case report. *Eur J Ophthalmol* 2022;32(1): NP119-NP124.

13 Kang YK, Park HS. Multiple-session subthreshold micropulse laser therapy for exudative perifoveal vascular anomalous complex: a case report. *Retin Cases Brief Rep* 2023;17(3):324-328.