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Transvitreal endoresection of peripheral exudative hemorrhagic chorioretinopathy: a clinicopathological study

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Abstract

Background To report a rare case of presumed early-stage peripheral exudative hemorrhagic chorioretinopathy (PEHCR), which was removed by transvitreal approach, and analyze the histological findings.

Case presentation A 76-year-old Japanese woman presented with a fundus lesion in her left eye, and was referred to our university hospital. Her best-corrected visual acuity was 1.0 with normal intraocular pressure in both eyes. The color fundus revealed a whitish elevated lesion, measuring about 2 disc diameters, in the inferior fundus. Fluorescein angiography depicted hyperfluorescence and fluorescein leakages in the lesion in the early and late phases, respectively. Indocyanine green angiography demonstrated the hypofluorescence in the lesion without any hyperfluorescent spots. Swept-source optical coherence tomography of the lesion demonstrated a subretinal solid mass with subretinal fluid and pigment epithelial detachments. Since clinical diagnosis of the fundus lesion could not be made, transvitreal endoresection of the lesion was conducted by pars plana vitrectomy. Her visual acuity remained good with no any complications 1 year after vitrectomy. Histopathologically, the lesion was made up of AE1/AE3 (an epithelial marker)-positive retinal pigment epithelial cells, with CD34 and alpha-smooth muscle actin-positive vessel walls, which were consistent with choroidal neovascularization (CNV). These clinicopathological findings led to the diagnosis of PEHCR.

Conclusion This is the first reported case of transvitreal endoresection of PEHCR, and the histopathology indicated that the origin was peripheral CNV.

Keywords Peripheral exudative hemorrhagic chorioretinopathy, Histopathology, Choroidal neovascularization, Vitrectomy

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Introduction

Peripheral exudative hemorrhagic chorioretinopathy (PEHCR) is considered an age-related degenerative disorder, typically presenting with pigment epithelial detachment (PED) in the peripheral fundus [1]. PEHCR complications include hemorrhages in the retinal pigment epithelium (RPE), exudation, subretinal fluid, and choroidal neovascularization (CNV); therefore, PEHCR might be a similar spectrum of age-related macular degeneration (AMD) or polypoidal choroidal vasculopathy (PCV) [1]. PEHCR presents with various retinochoroidal elevations, which could cause misdiagnosis as choroidal melanoma [2]. Multimodal imaging studies have indicated that the origin of PEHCR would be choroidal vascular channels; however, previous pathological studies could not determine the origin or verify the histological components of CNV [3, 4]. PEHCR is likely to be self-limiting; however, advanced hemorrhagic situations could be vision-threatening. We herein report a rare case of presumed early-stage PEHCR, which could be removed by transvitreal approach, and analyze the histological findings.

Case description

A 76-year-old Japanese woman presented with a fundus lesion in her left eye and was referred to our university hospital. She has received fundus checks every year in a nearby clinic, and there was no abnormality in the fundus last year. Her best-corrected visual acuity was 1.0 with normal intraocular pressure in both eyes. The color fundus revealed a whitish elevated lesion, measuring about 2 disc diameters, with marginal hard exudates in the inferior fundus (Fig. 1A). There was no hemorrhage or drusen in the fundus. Fluorescein angiography (FA) depicted hyperfluorescence and leakage (Fig. 1B) in the lesion in the early and late phases, respectively. Indocyanine green angiography (ICGA) demonstrated hypofluorescence (Fig. 1C) in the lesion without any hyperfluorescent spots suggestive of PCV. Swept-source optical coherence tomography (SS-OCT) in the lesion demonstrated a subretinal solid mass with subretinal fluid and PEDs in her left eye (Fig. 1D, E). The macula showed no abnormalities or choroidal thickening. Systemic workup revealed a small pulmonary lesion in her right lung, which has been observed by a physician. The differential diagnosis of the subretinal elevated lesion included chorioretinal disorders such as non-pigmented RPE adenoma, peripheral PCV, and chronic serous chorioretinopathy (CSC) with

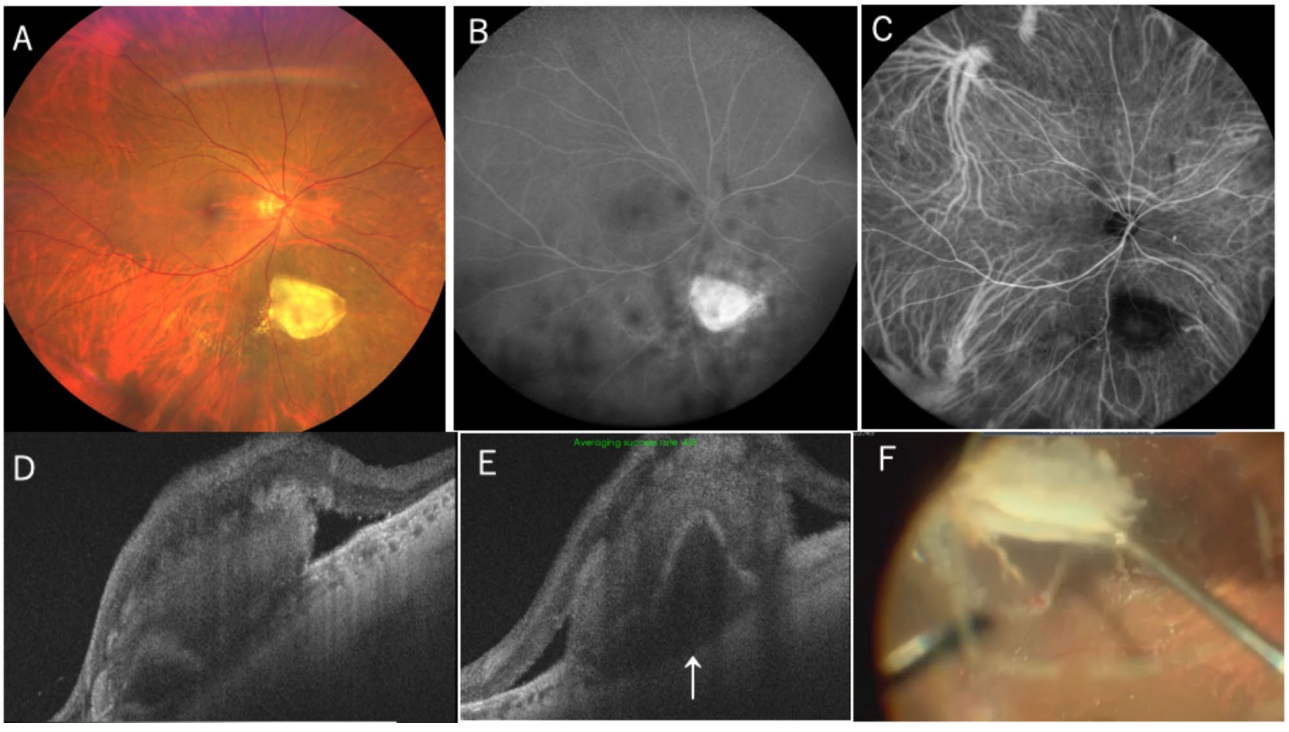

Fig. 1 Fundus and multi-modal imaging in peripheral exudative hemorrhagic chorioretinopathy (PEHCR). **A**: The color fundus revealed a whitish elevated lesion, measuring about 2 disc diameters, in the inferior fundus. **B**: Fluorescein angiography depicted fluorescein leakages in the lesion in the late phase. **C**: Indocyanine green angiography demonstrated hypofluorescence in the lesion. **D**: Swept-source optical coherence tomography (SS-OCT) in the horizontal section of the lesion demonstrated a subretinal solid mass with subretinal fluids. **E**: SS-OCT in the vertical section of the lesion demonstrated a subretinal solid mass with subretinal fluid and marked retinal pigment epithelial detachment (arrow). **F**: Pars plana vitrectomy combined with transvitreal endoresection of the lesion was conducted

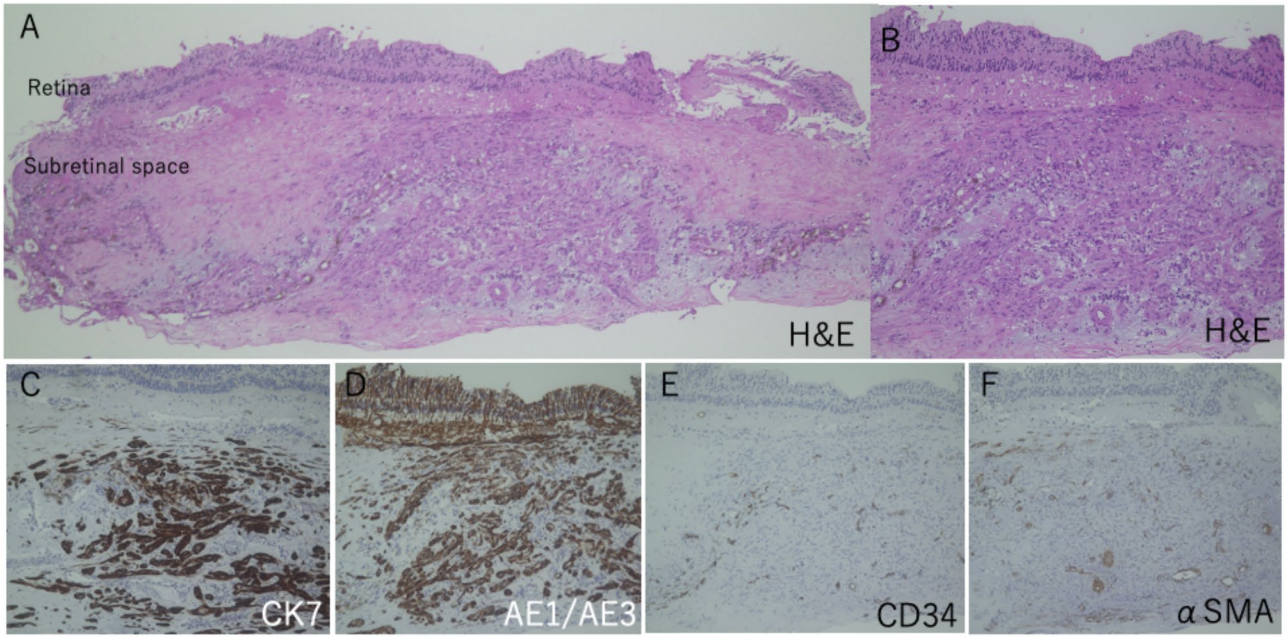

Fig. 2 Histopathological findings of the resected PEHCR. **A**: At a low magnification, the proliferative lesion was noted in the subretinal space. **B**: At a high magnification, there were round cells with or without pigmentation as well as vascular lumens and mucinous stroma in the lesion. **C**: Cytokeratin 7 (CK7)-positive cells were markedly observed. **D**: The proliferative cells were mostly positive for AE1/AE3. **E**: CD34-positive endothelial cells were intermingled. **F**: Several alpha-smooth muscle actin (αSMA)-positive cells were also noted

subretinal fibrosis. Since *the patient's vision was good and likely asymptomatic, observation was an option. After a discussion with the patient about whether to choose observation or to proceed with surgery for a quicker diagnosis, she subsequently hoped the latter choice.* Transvitreal endoresection of the lesion was conducted by pars plana vitrectomy (Fig. 1F). Briefly, laser photocoagulation was conducted around the lesion 2 weeks before vitrectomy. Twenty-five-gauge plana vitrectomy was conducted as follows: 4-ports trocars were inserted, and phacoemulsification was initially conducted without insertion of intraocular lens (IOL) at this moment. After that, posterior capsule was excised at around 5 mm by the vitreous cutter. Diathermy was done around the lesion following core vitrectomy. The edge of the lesion was gently grasped by the vitreous forceps, which was pulled up to the anterior chamber. The lesion was eventually extracted from the scleral wound of phacoemulsification. IOL was placed in the capsule, and fluid/air exchange was conducted.

Histopathologically, the lesion was made up of pigmented and non-pigmented round cells lining beneath the retina (Fig. 2A, B), where microvessels without hyalinization were intermingled with mucinous stroma and marginal inflammatory cell infiltration. There was no nuclear atypia in the lesion (Fig. 2B). Periodic acid Schiff (PAS) staining revealed neither apparent mucin secretion nor basement membranes surrounding RPE cells. Immunohistochemical examination revealed that cytokeratin 7 (Fig. 2C) and AE1/AE3 (Fig. 2D), epithelial markers, were positive for non-pigmented cells consistent with RPE cells, while glial fibrillary acidic protein-positive cells were not observed. CD34 (Fig. 2E) and alpha-smooth muscle actin (αSMA) (Fig. 2F) were positive in the vascular walls. Ki67-positive cells were occasionally noted in RPE cells. Her visual acuity remained good with no any complications 1 year after vitrectomy.

Discussion and conclusion

The diagnosis of the elevated lesion could not exclude the possibility of PEHCR, because this is an acquired peripheral elevated lesion with PED arising in an old woman. Mantel et al. previously demonstrated histopathology of an enucleated eye with PEHCR due to hemorrhagic glaucoma, showing hemorrhagic RPE rupture in the peripheral lesion with no evidence of CNV [4]. Therefore, they did not prove the hypothesis of choroidal neovascular origin in the situation. This study for the first time demonstrated that the contents of PED noted on OCT were made up of CD34/αSMA-positive neovessels, indicating that the origin of PEHCR could be peripheral type 1 CNV. However, it is not common that the appearance was whitish, which might be due to the old hemorrhage in this case. AE1/AE3-positive cells were suggestive of activated RPE cells with proliferation and depigmentation [5], which were corresponding to whitish appearance observed in this case. Furthermore, FA depicted hyperfluorescence and leakage in the lesion, while ICGA could not detect the CNV. This discrepancy might be

pathologically due to activated RPE cell proliferation admixed with microvessels within the lesion, which were not common in CNV lesions of AMD.

Venkatesh et al. proposed that the cause of peripheral choroidal hemorrhages in PEHCR might be transluminal vascular pressure difference [6]. On the other hand, the current results suggest that PEHCR would initially form from peripheral type 1 CNV with RPE proliferation, eventually leading to hemorrhagic PED. The diagnosis of PEHCR has been exclusively made based on clinical findings such as temporal locations on fundus photograph and PED on OCT [1, 2]. Therefore, it would be disputable whether PEHCR would be categorized into peripheral type 1 CNV (atypical peripheral CNV) although the angiographic findings might not be consistent with typical CNV.

The subretinal elevated lesion in this case needed to be differentiated from other chorioretinal disorders such as non-pigmented RPE adenoma, peripheral PCV, and CSC with subretinal fibrosis. Clinically, coloration of this elevated tumor was whitish with marginal exudation, in which histologically there were no tumor cells with cellular atypia and typical cytoplasm. Moreover, proliferative RPE cells were not surrounded by basement membranes, indicating that those findings are different from those in non-pigmented RPE adenoma [7]. PCV manifests polypoidal lesions or abnormal vascular networks on ICGA, where hyalinization of choroidal vessels is noted [8]. Those clinicopathological findings were not observed in this case. Regarding CSC, in this case, there were no pachychoroid spectrum abnormalities such as thickened choroid with pachyvessels, disruption of watershed zone, and vascular hyperpermeability. Further, subretinal fibrosis associated with CSC occurs exclusively in the posterior retina rather than the peripheral retina [9].

In conclusion, this is the first case of transvitreal endoresection of PEHCR, and the histopathology indicated that the origin was peripheral CNV.

Abbreviations

CSC	Chronic serous chorioretinopathy
CNV	Choroidal neovascularization
PCV	Polypoidal choroidal vasculopathy
PEHCR	Peripheral exudative hemorrhagic chorioretinopathy
RPE	Retinal pigment epithelium
PED	Retinal pigment detachment
PAS	Periodic acid Schiff

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SK wrote whole body of this manuscript, acquired clinical and pathological data and interpreted all data. AS gave critical advice on pathological data and evaluation, as well as did critical revision of this manuscript. SI evaluated this manuscript and did critical revision of this manuscript.

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Consent for publication
The patient gave written informed consent for her personal or clinical details along with any identifying images to be published in this study.

Competing interests
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Ethics approval and consent to participant
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References

1. Elwood KF, Richards PJ, Schildroth KR, Mititelu M. Peripheral exudative hemorrhagic chorioretinopathy (PEHCR): diagnostic and therapeutic challenges. Med (Kaunas) 2023, 59(9).
2. Sodhi GS, Singh N, Wrenn J, Singh AD. Peripheral hemorrhagic chorioretinopathy: differentiating features from choroidal melanoma. Ocul Oncol Pathol. 2023;9(1–2):1–8.
3. Vandefonteyne S, Caujolle JP, Rosier L, Conrath J, Quentel G, Tadayoni R, Maschi C, Le Mer Y, Dot C, Aknin I, et al. Diagnosis and treatment of peripheral exudative haemorrhagic chorioretinopathy. Br J Ophthalmol. 2020;104(6):874–8.
4. Mantel I, Uffer S, Zografos L. Peripheral exudative hemorrhagic chorioretinopathy: a clinical, angiographic, and histologic study. Am J Ophthalmol. 2009;148(6):932–8. e931.
5. Hunt RC, Davis AA. Altered expression of keratin and vimentin in human retinal pigment epithelial cells in vivo and in vitro. J Cell Physiol. 1990;145(2):187–99.
6. Venkatesh R, Mishra P, Nahata H, Reddy NG, Yadav NK, Chhablani J. Peripheral and macular polypoidal choroidal vasculopathy: A retrospective comparative case series. Eur J Ophthalmol. 2023;33(1):448–54.
7. Nakamura S, Hikita N, Yamakawa R, Moriya F, Yano H, Furusato E, Cameron JD, Rushing EJ. A clinically challenging diagnosis of adenoma of the retinal pigment epithelium presenting with clinical features of choroidal hemangioma. Clin Ophthalmol. 2012;6:497–502.
8. Nakashizuka H, Mitsumata M, Okisaka S, Shimada H, Kawamura A, Mori R, Yuzawa M. Clinicopathologic findings in polypoidal choroidal vasculopathy. Invest Ophthalmol Vis Sci. 2008;49(11):4729–37.
9. Hansraj S, Chhablani J, Behera UC, Narula R, Narayanan R, Sahoo NK. Inner choroidal fibrosis: an optical coherence tomography biomarker of severity in chronic central serous chorioretinopathy. Am J Ophthalmol. 2024;264:17–24.

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