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CASE REPORT

Double neovascularization in the same eye with pachychoroid neovasculopathy: one exudative and the other non-exudative

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Abstract

Pachychoroid neovasculopathy (PNV) is a pachychoroid spectrum disease characterized by macular neovascularization (MNV), dilated outer choroidal vessels (pachyvessels), and/or increased choroidal thickness. In PNV cases, optical coherence tomography angiography (OCTA) can reveal MNV with high resolution. A 65-year-old male patient was admitted to our clinic with the complaint of decreased vision in the right eye. On dilated fundus examination, retinal pigment epithelium changes were present in the foveal and extrafoveal areas in both eyes. There was subretinal fluid in the fovea and irregular pigment epithelial detachment in the right eye. Subfoveal MNV was detected in 3 × 3 mm sections of OCTA. A non-exudative MNV was also detected in a larger 6 × 6 mm area imaged with OCTA. Simultaneous non-exudative quiescent MNV in the extrafoveal region of the same eye can be observed. To avoid missing those cases, it is critical to perform OCTA imaging sections, including the extrafoveal areas.

Keywords: Macular neovascularization; optical coherence tomography angiography; pachychoroid neovasculopathy.

Pachychoroid spectrum diseases consist of a group of diseases characterized by choroidal hyperpermeability, dilated outer choroidal vessels (pachyvessels), and/or choroidal thickening without the characteristic age-related macular degeneration changes. Pachychoroid neovasculopathy (PNV) is a pachychoroid spectrum disease characterized by macular neovascularization (MNV).[1]

Optical coherence tomography angiography (OCTA) is a non-invasive imaging method that provides high-resolution three-dimensional imaging of the chorioretinal circulation without the use of contrast dye.[2] It is superior to fluorescein angiography (FA) in terms of high-resolution visualization of type 1 MNV morphology under the retinal pigment epithelium (RPE).[2]

Non-exudative or quiescent MNVs are those that do not show intraretinal or subretinal exudation on cross-sectional OCT, but can be detected on dye angiography or OCTA.[3] As far as we know, no case of PNV in the same eye with both quiescent and exudative MNV has been reported.

One of the most significant limitations of OCTA is that the resolution decreases with increasing imaging area. Each

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OCTA device uses unique software to scan the retinal areas of varying widths.[2] Small field of view modes is frequently used in MNV-related clinical studies to obtain high-resolution images. Extrafoveal pathologies, on the other hand, may be overlooked in this method as well.

In this study, we aimed to present a case of PNV with double MNV in the same eye, one exudative in the fovea and the other non-exudative in the extra-foveal area, and compare these two MNVs in terms of OCTA findings and response to anti-VEGF therapy.

Case Report

A 65-year-old male patient was admitted to our clinic with the complaint of decreased vision in the right eye. He had no systemic disease. Visual acuity was counting fingers at 2 meters in the right eye, and 20/20 in the left eye. Anterior segment examination was normal. On dilated fundus examination, RPE changes were present in both eyes (Fig. 1a).

There was subretinal fluid in the fovea and a double-layer sign (DLS) indicating shallow, irregular pigment epithelial detachment (PED) in the right eye, while the left eye was normal (Figure 1b). The subfoveal choroidal thickness increased (420 µm) under the shallow PED, the outer choroidal vessels dilated, and the choriocapillaris layer became thinner (Figure 1b). Subfoveal MNV was detected in a well-defined lacy pattern with perilesional halo in 3x3 mm sections of OCTA (Figures 1c and d).

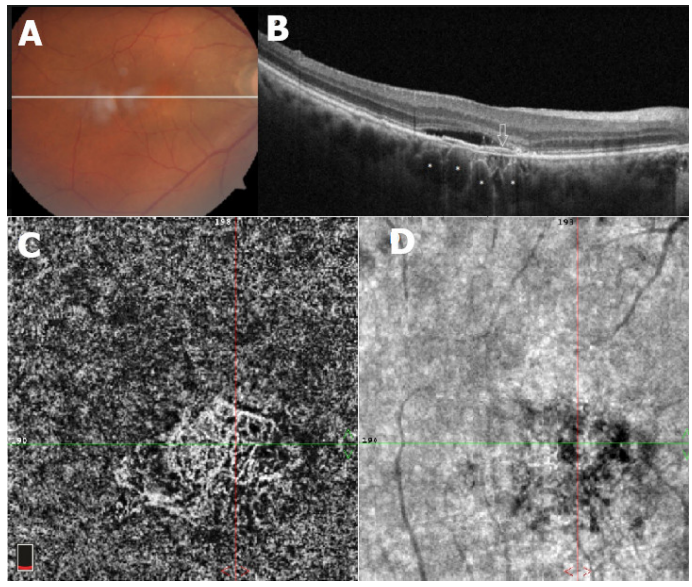

Fig. 1. (a) Retina pigment epithelium changes in fundus photography (b) In the OCT image, subretinal fluid in the fovea and a double-layer sign (arrow), dilated external choroidal vessels (spots), (c and d) In OCTA (3 × 3 mm), subfoveal type 1 MNV in a lacy pattern

RPE changes in the extrafoveal area superior to the macula were observed in fundus autofluorescence imaging (Fig. 2a). Another shallow PED with a similar choroidal morphology was observed, with no signs of exudation in the spectral-domain OCT imaging passing through this area (Fig. 2b). FA detected non-specific hyperfluorescence, in which

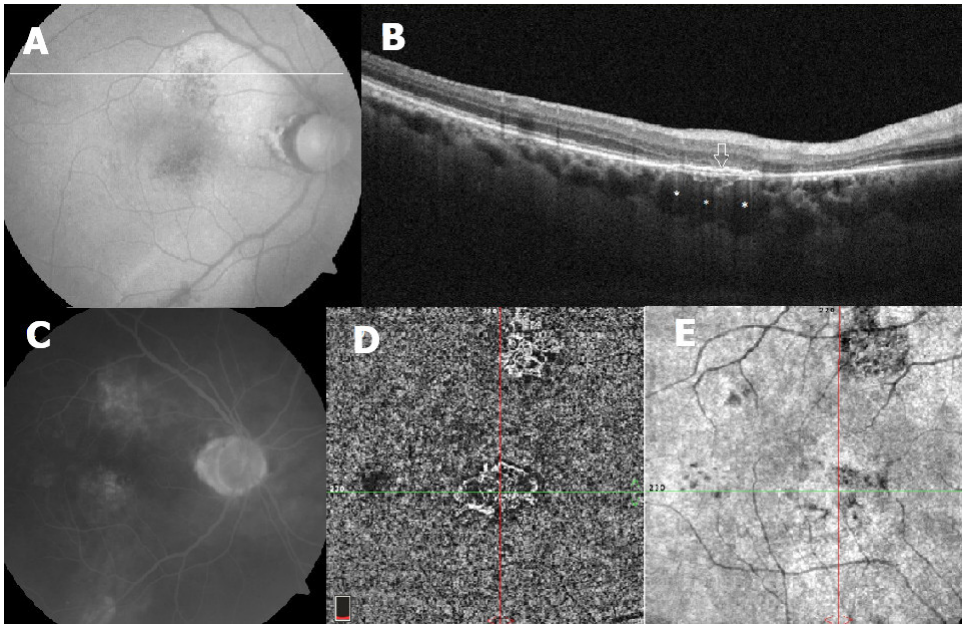

Fig. 2. (a) In fundus autofluorescence imaging, RPE changes in the extrafoveal area (b) Another shallow PED with no signs of exudation in the OCT imaging passing through this area (c) non-specific hyperfluorescence in FA (d and e) in OCTA (6 × 6 mm) quiescent MNV

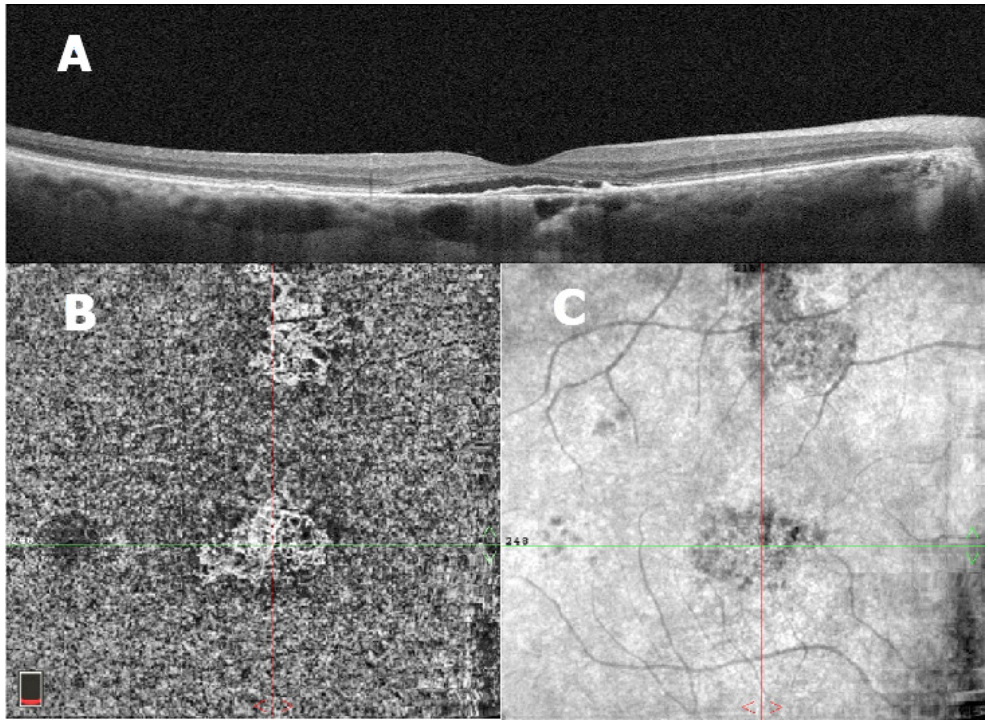

Fig. 3. (a) Persistence of subretinal fluid in the control OCT (b and) No significant difference in both MNVs in terms of area change and morphological features

the window defect or leakage pattern could not be distinguished from each other (Fig. 2c). A non-exudative MNV was also detected in a larger 6 × 6 mm area imaged with OCTA (Figures 2d and e). Non-exudative MNV had a similar morphology to exudative MNV, but lacked a perilesional halo.

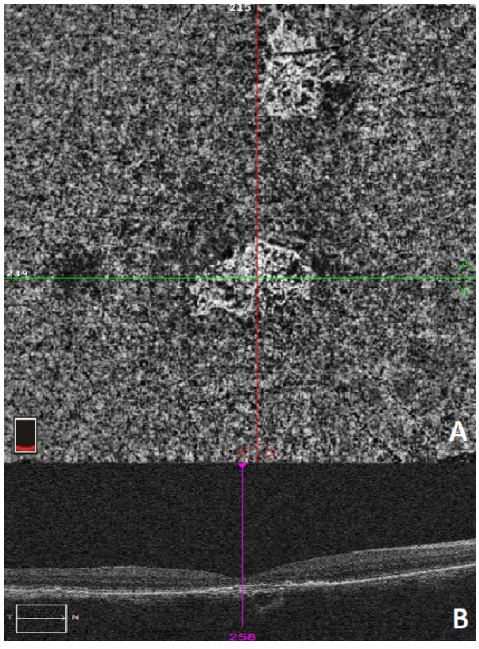

Fig. 4. (a) in the OCTA image, the perilesional halo disappeared, fine branching decreased (b) in the spectral-domain OCT image, the subretinal fluid appears to have disappeared

The patient received a loading dose of three intravitreal bevacizumab (1.25 mg/0.05 mL) injections in the right eye, with 1-month interval between injections. In the control OCT, subretinal fluid was found to be persistent (Fig. 3a). There was no significant difference in either exudative or non-exudative MNV in terms of area change or morphological features on OCTA (Figures 3b and c).

3 months later, as the fourth dose, the patient received intravitreal aflibercept (2 mg/0.05 mL) injection. The subretinal fluid disappeared during the 1st month of aflibercept treatment, but visual acuity did not change. The perilesional halo disappeared, fine branching decreased, and the area remained unchanged in exudative MNV that became inactive (Figures 4a and b). During the follow-ups, no morphological changes in quiescent MNV were observed.

Discussion

We presented a PNV case with fundoscopic features, typical pachyvessel findings on OCT, and accompanying MNV images on OCTA. However, he had a second simultaneous MNV in the superior extrafoveal area detected with a 6 × 6 mm OCTA scan, which was not within the imaging limits of a 3×3 mm scan.

DLS indicates shallow, irregular PED, which has been shown

to have a high predictive value for MNV.[4] Dansingani et al.[5] observed that OCTA detected 95% of MNV under shallow PEDs. Consistently, MNVs located beneath the shallow PEDs could be visualized with high resolution using OCTA in our case. However, distinguishing between a window defect caused by RPE degeneration and a leakage pattern caused by MNV with FA was difficult due to contrast material leakage and blockage of the RPE. These findings were consistent with the literature, which reported that OCTA has a higher sensitivity than FA to detect sub-RPE MNV in shallow PEDs.[6,7] In this way, the changes observed in MNV morphology over time in our case could be monitored with OCTA.

The prevalence of quiescent MNV in PNV cases has been reported as 10.9%.[3,4] In our study, quiescent MNV was extrafoveal, well-circumscribed, and irregularly shaped morphology. Similarly, Carnevali et al.[3] reported that unlike AMD, the quiescent MNV morphology observed in PNV is irregularly shaped, well-defined, with no visible core, and located extrafoveally. There is no agreement on the clinical significance and natural history of non-exudative MNVs yet. However, a research comparing quiescent MNV in AMD and PNV by Forte et al. showed that quiescent MNV was activated in 12 of 27 eyes in PNV patients; BCVA was better than in the AMD group, and it responded better to anti-VEGF injection.[6] It is important to keep an eye on quiescent MNV because they could become active and reduce vision acuity. During the follow-up, no exudation was observed in our case. Long-term studies are clearly required to understand its natural history.

Different data have been reported on anti-VEGF efficacy in MNV secondary to PNV. Some claimed that anti-VEGFs improved anatomical improvement, but had no effect on visual acuity.[8] There is no consensus on different anti-VEGF effectiveness. While ranibizumab and aflibercept injections were compared, patients who received aflibercept had a significantly greater reduction in subfoveal choroidal thickness. However, the improvements in visual acuity and central macular thickness were comparable.[9] In our case, there was no response to bevacizumab; however, anatomical response to aflibercept was obtained, despite the fact that visual acuity did not change. Aflibercept may be effective in bevacizumab-resistant patients. This hypothesis should be investigated in randomized controlled trials with long follow-up.

In our case, unlike 3×3 imaging, extrafoveal MNV was only obtained with 6x6 imaging. It is obvious that the quality will decrease after a certain point as the image area increases; however, it is clear that wider modalities are needed to view the extrafoveal suspicious areas. In this regard, new-generation wide-angle OCTAs appear to be promising.[2]

Conclusion

It has been observed that there may be more than one MNV, one active and the other quiescent, in cases with PNV. To avoid missing those cases, it is critical to perform OCTA imaging sections, including the extrafoveal areas. The difference between non-exudative and exudative MNV in terms of OCTA morphology may be the only presence of perilesional halo observed in exudative cases. There may not be a significant difference between non-exudative and exudative MNVs in terms of OCTA response to anti-VEGF injections in the early period. Randomized studies are needed in terms of OCTA findings.

Notice

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