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Optical Coherence Tomography Angiography Reveals Choriocapillaris Flow Reduction in Placoid Chorioretinitis

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Purpose: To elucidate the origin of disease in acute posterior multifocal placoid pigment epitheliopathy (APMPPE) and related placoid disorders, and to determine the principle tissue level of involvement: retinal pigment epithelium (RPE) versus choriocapillaris (CC). To determine the prevalence, extent, and persistence of choroidal flow reduction in placoid chorioretinitis using en face optical coherence tomography (OCT) and OCT angiography (OCTA).

Design: Multicenter, prospective case series.

Participants: Patients with a clinical diagnosis of APMPPE, persistent placoid maculopathy (PPM), or relentless placoid chorioretinitis (RPC).

Methods: Morphologic evaluation of en face structural OCT and OCTA images with customized segmentation through the deep capillary plexus, outer nuclear layer, inner segment ellipsoid band, choriocapillaris, and outer choroid.

Main Outcome Measures: Segmented images were graded by 3 masked readers with regard to reduction of flow and signal attenuation, and intergrader agreement was determined by mean unweighted kappa analysis.

Results: In this study, 24 eyes of 15 patients with APMPPE, PPM, or RPC were recruited and 60% of patients were male (N = 9) and the mean age was 33.6 years (range, 19−73 years). Of the 24 eyes, 96% (23/24) were graded as definite (18/24, 75%) or questionable (5/24, 21%) flow reduction within the choriocapillaris on OCTA, and 58% (14/24) were graded as definite decreased flow within the outer choroid. Mean weighted kappa analysis among readers was 0.655 for OCTA of the choriocapillaris and 0.684 for OCTA of the outer choroid. Areas of choriocapillaris flow deficit correlated closely with ischemic lesions seen with fluorescein angiography and indocyanine green angiography but were more extensive with OCTA and significantly improved with treatment or nontreatment follow-up. Corresponding zones of outer retinal disruption also were identified and colocalized with the areas of choriocapillaris flow reduction seen with OCTA.

Conclusions: Optical coherence tomography angiography indicates that the inner choroid is the primary site of disease pathogenesis in APMPPE and related placoid disorders with secondary photoreceptor disruption. Optical coherence tomography angiography may be used to enhance diagnosis of placoid disorders and to monitor the progression of choriocapillaris ischemia and its response to therapy. *Ophthalmology Retina 2017;1:77-91 © 2016 by the American Academy of Ophthalmology*

Acute posterior multifocal placoid pigment epitheliopathy (APMPPE) was first described by Gass in 1968[1] in a series of 3 young women who developed rapid vision loss secondary to multiple subretinal lesions resembling an embolic choroiditis. In his seminal report, Gass chose the term "pigment epitheliopathy" to reflect the most significant clinical tissue involvement, but noted "it is impossible to accurately classify this disease as one involving the choroid, the pigment epithelium or both."[1] Other groups in that era questioned whether APMPPE was indeed a distinct clinical disorder from the previously reported exudative choroiditis by Duke-Elder and Perkins in 1966,[2] but noted the presence of severely depressed electro-oculogram testing indicating dysfunction of the retinal pigment epithelium (RPE).[3] By using multimodal imaging, Spaide[4] and Spaide et al[5] found evidence supporting primary involvement of the choroidal vasculature in APMPPE. Other distinct but related disorders such as relentless placoid chorioretinitis (RPC)[6,7] and persistent placoid maculopathy (PPM)[8–10] were later described.

More recently, studies have used spectral-domain optical coherence tomography (SD-OCT) to investigate the pathogenesis of APMPPE[11] and persistent placoid,[12] supporting Van Buskirk et al's[13] and Deutman et al's[3] original hypothesis that these disorders may be primarily due to choriocapillaris ischemia. Optical coherence tomography angiography (OCTA) and en face segmentation are advanced imaging modalities that provide novel

© 2016 by the American Academy of Ophthalmology
Published by Elsevier Inc.
http://dx.doi.org/10.1016/j.oret.2016.08.008
ISSN 2468-6530/16

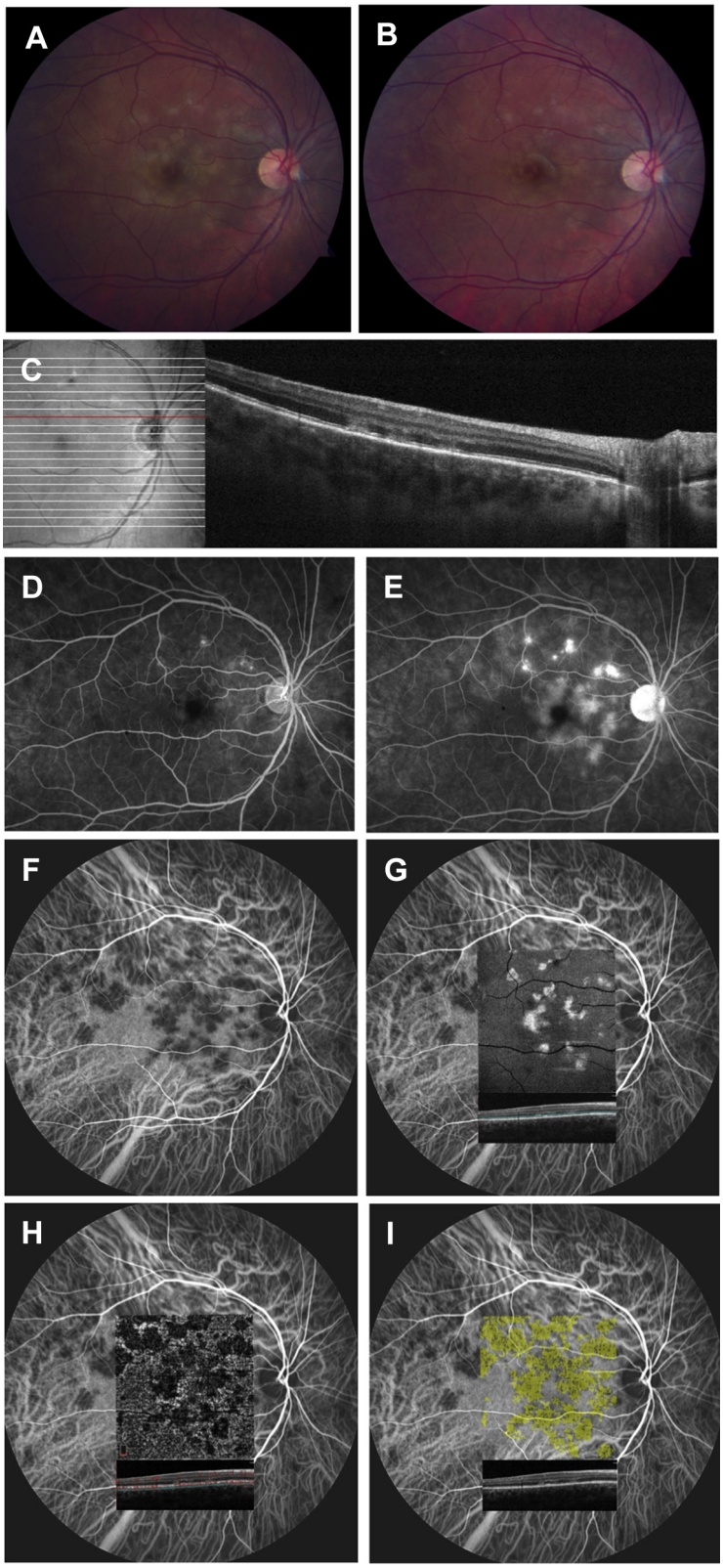

Figure 1. Multimodal imaging and optical coherence tomography angiography (OCTA) overlay on indocyanine green angiography (ICGA) in acute posterior multifocal placoid pigment epitheliopathy (APMPPE). Color fundus photograph of right eye demonstrates multifocal placoid lesions of the posterior pole at baseline (**A**) with corresponding spectral-domain optical coherence tomography (SD-OCT) showing outer retinal disruption (**C**). Fundus photograph 1 week later and after systemic steroid therapy shows partial resolution of the lesions (**B**). On presentation, early fluorescein angiography (FA)

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