Correspondence

Optical Coherence Tomography Angiography Quantitative Assessment of Choriocapillaris Blood Flow in Central Serous Chorioretinopathy

EDITOR:

WE READ WITH INTEREST THE ARTICLE TITLED "OPTICAL Coherence Tomography Angiography Quantitative Assessment of Choriocapillaris Blood Flow in Central Serous Chorioretinopathy," by Rochepeau and associates.[1] The authors found an increased average flow signal void area in the unaffected eyes of central serous chorioretinopathy (CSC) patients, compared to controls. Accordingly, they conclude there is choriocapillaris (CC) hypoperfusion in CSC.

We would like to contribute with a rationale for the optical coherence tomography angiography (OCTA) findings and potential artifacts limiting their interpretation.

As CSC is part of the pachychoroid disease spectrum, which includes pachychoroid pigment epitheliopathy (PPE), a proportion of the "unaffected" fellow eyes evaluated may present PPE (which can be seen in the bottom right OCT B-scan in Rochepeau and associates' Figure 1).[2] The irregularity and hyperreflectivity of the external retinal layers and retinal pigment epithelium (RPE), which is a frequent finding in CSC, would contribute to the attenuation of OCTA signal from the choroid and average flow void area increase in the CC.[3] This may also explain why "At 3 months' follow-up, the mean total area of flow voids was greater in the affected eyes of CSC patients after SRD resolution than in the unaffected eyes." After the subretinal liquid reabsorbs, the RPE is many times hyperreflective and CC signal is decreased, again increasing the area of flow void. In this line, for CC assessment with OCTA it is important to evaluate not only the *en face* flow image, but also the structural image to exclude potential signal attenuation artifacts.[4]

A thickened choroid and hyperpermeability are thought to play an important role in CSC. Notably, Chan and associates studied eyes with CSC using OCTA and identified mostly areas of exaggerated flow.[5] Additionally, Doppler ultrasonography imaging studies also suggest choroidal hyperperfusion in CSC.[6] The dynamic choroid behavior, the CSC-associated hyperpermeability, and the presence of pachyvessels may all affect CC assessment using OCTA. Remarkably, it is known that not only areas of slow flow may be misinterpreted in OCTA choroidal slabs, but also high blood flow is associated in a "fringe averaging" effect and a decrease in signal.[3] We hypothesize that the coexistence of pachyvessels along with a hyperpermeable CC may be associated with an increased blood volume with slower blood velocity, which would be associated with decreased OCTA signal and increased flow void area.

Moreover, we would like to emphasize the importance of adapting the statistical analyses if 2 eyes are included per patient. An adequate "within subjects" approach should be adopted in this case.[7] Additionally, a multivariate analysis would be of particular interest to further interpret the existence of potential confounders.

Lastly, we would like to thank our colleagues for the interesting work and pertinent aim. These discussion topics intend to raise awareness on the artifacts associated with choroidal OCTA imaging, and other confounding factors, which may all limit our ability to reach a conclusion on the existence or not of CC hypoperfusion in CSC patients.

DAVID CORDEIRO SOUSA
CARLOS MARQUES-NEVES
Lisboa, Portugal
KIM VIEIRA KAYAT
São Paulo, Brazil
JOÃO BARBOSA BREDA
Lisbon, Portugal

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