Multimodal OCT reflectivity analysis of the cystoid spaces in Cystoid Macular Edema

M.D. Farci, Roberta[1]; M.D. Sellam, Alexandre[2]; M.D. Coscas, Florence[2]; Prof. Coscas, Gabriel J.[2]; Prof. Souied, Eric[2]; M. D. Napoli, Pietro Emanuele[1]; Prof. Diaz, Giacomo[3,1]; Prof. Fossarello, Maurizio[1].

1. Eye Clinic, University of Cagliari, Cagliari, Italy.

2. Eye Clinic, Hopital Intercommunal, Créteil, France.

3. Biomedical Science Department, University of Cagliari, Cagliari, Italy.

Sources of support: none. Competing interest and financial disclosure: none.

The authors confirm that all data underlying the findings are fully available without restrictions. "Authors confirm that all data underlying the findings in the present study are freely available in the manuscript".

Multimodal OCT reflectivity analysis of the cystoid spaces in Cystoid Macular Edema

KEY WORDS

Cystoid Macular edema; Retinal Vein Occlusions; Optical Coherence Tomography Angiography, OCT-A; SD-OCT; Reflectivity; Diabetic Macular Edema; Cyst Gray Level; diabetic retinopathy; Multimodal Analysis; Multimodal Imaging.

ABSTRACT

Purpose: to compare and evaluate images of macular cysts with different degrees of reflectivity (from gray to black signal) as observed in B-scan Spectral Domain OCT (SDOCT) and En Face OCT with decorrelation signal obtained with OCT-angiography (OCTA) in eyes with cystoid macular edema (CME) secondary to diabetic retinopathy (DR) and retinal vein occlusion (RVO).

Methods: Images from 3033 patients affected by CME secondary to diabetes or RVO examined OCTA (Optovue XR Avanti, Optovue, USA) at the University Eye Clinic of Creteil, Hopital Intercommunal, France, and at the University Eye Clinic of Cagliari, "San Giovanni di Dio" Hospital, Italy, were retrospectively examined. The deep capillary plexus OCTA images and the corresponding EnFace OCT images, both acquired with the same automatic

segmentation, were overlapped to compose RGB color images as red and green channels, respectively, using ImageJ software (National Institutes of Health, Bethesda, MD). Then, linear regions of interest were traced on the color images to obtain the profiles of OCTA and EnFace gray values. Number of pixels, mean gray value and standard deviation of the area traced in OCT-A and EnFace image were respectively analyzed and statistically correlated. Data were exported to Excel to create the plots.

Results: We found 94 patients with DME and 27 patients with RVO showing intraretinal macular cystoid spaces with similar homogeneous, gray-looking content, and 73 patients with DME and 113 patients with RVO showing macular cystoid spaces with homogeneous, black-looking content, as observed at SD-OCT, EnFace and OCTA scans. Interestingly, the limits of macular cystoid spaces are clearly detectable with OCTA. The analysis of red and green profiles demonstrated a clearly visible overlapping between the average OCTA and En Face signal observed around cystoid spaces, that could be attributed to a relationship between the dynamic vascularization and structural density of the tissue.

Conclusions: This is the first investigation which characterizes and correlates OCTA and enface signals on images of macular cystoid spaces in DR and RVO. The low intensity OCTA signals observed inside cystoid spaces, pose a relevant question about their nature, as to whether they are due to the presence of corpusculated material poured out from blood-ocular-barrier or must be considered OCTA artifacts.