

Quantitative Wide-Field Swept-Source Optical Coherence Tomography Angiography and Visual Outcomes in Retinal Artery Occlusion

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Abstract : Purpose: Retinal artery occlusion (RAO) is an ophthalmic emergency that can lead to poor visual outcome and is associated with an increased risk of cerebral stroke and cardiovascular events. Fluorescein angiography (FA) is the traditional diagnostic tool for RAO; however, wide-field swept-source optical coherence tomography angiography (WF SS-OCTA), as a nascent imaging technology, is able to provide quick and non-invasive angiographic information with a wide field of view. In this study, we looked for associations between OCT-A vascular metrics and visual acuity in patients with prior diagnosis of RAO. Methods: Patients with diagnoses of central retinal artery occlusion (CRAO) or branched retinal artery occlusion (BRAO) were included. A 6mm x 6mm Angio and a 15mm x 15mm AngioPlex Montage OCT-A image were obtained for both eyes in each patient using the Zeiss Plex Elite 9000 WF SS-OCTA device. Each 6mm x 6mm image was divided into nine Early Treatment Diabetic Retinopathy Study (ETDRS) subfields. The average measurement of the central foveal subfield, inner ring, and outer ring was calculated for each parameter. Non-perfusion area (NPA) was manually measured using 15mm x 15mm Montage images. A linear regression model was utilized to identify a correlation between the imaging metrics and visual acuity. A P-value less than 0.05 was considered to be statistically significant. Results: Twenty-five subjects were included in the study. For RAO eyes, there was a statistically significant negative correlation between vision and retinal thickness as well as superficial capillary plexus vessel density (SCP VD). A negative correlation was found between vision and deep capillary plexus vessel density (DCP VD) without statistical significance. There was a positive correlation between vision and choroidal thickness as well as choroidal volume without statistical significance. No statistically significant correlation was found between vision and the above metrics in contralateral eyes. For NPA measurements, no significant correlation was found between vision and NPA. Conclusions: This is the first study to our best knowledge to investigate the utility of WF SS-OCTA in RAO and to demonstrate correlations between various retinal vascular imaging metrics and visual outcomes. Further investigations should explore the associations between these imaging findings and cardiovascular risk as RAO patients are at elevated risk for symptomatic stroke. The results of this study provide a basis to understand the structural changes involved in visual outcomes in RAO. Furthermore, they may help guide management of RAO and prevention of cerebral stroke and cardiovascular accidents in patients with RAO.

Keywords : OCTA, swept-source OCT, retinal artery occlusion, Zeiss Plex Elite

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