CHOROIDAL THICKNESS IN DIABETIC RETINOPATHY IMAGED WITH SWEPT-SOURCE OPTICAL COHERENCE TOMOGRAPHY

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Introduction: Breakdown of the inner blood-retina barrier is the hallmark of vascular pathophysiological mechanisms of diabetic retinopathy (DR), but recent research has devoted an increasingly significant role for the choroidal vasculature. Swept-source optical coherence tomography (SS-OCT) provides better resolution and improved automated segmentation for deep choroidal imaging, when compared to standard enhanced depth imaging protocols for spectral-domain OCT. The purpose of this work was to compare choroidal thickness (CT) in different stages of DR with healthy controls, imaged with SS-OCT.

Methods: Multicenter, prospective cross-sectional study. Diabetic eyes were recruited and compared with healthy age-matched controls. Exclusion criteria included other retinal diseases, spherical equivalent ≥±6.00D and recent (<3 months) intra-vitreal injections or laser treatments. Diabetic eyes were stratified into 4 groups: diabetes without DR (no-DR), non-proliferative DR (NPDR), NPDR with diabetic macular edema (NPDR+DME) and proliferative DR. Protocol for all participants included complete ophthalmologic exam and bilateral SS-OCT imaging (DRI OCT-1 Atlantis, Topcon®) with a 3D horizontal protocol. CT maps were obtained in the ETDRS grid subfields using automated segmentation. Mean CT was calculated as the mean value within the ETDRS grid and central CT as the mean value for the central 1mm. Univariate and multivariate multilevel mixed linear models (including correlated measures between 2 eyes) were performed.

Results: Fifty eyes of 25 healthy subjects and 160 eyes of 90 diabetic patients were included (no-DR n=27; NPDR n= 51; NPDR+DME n= 61; PDR n= 21). Mean age was 64.4±12.9 years for the control group and 65.7±8.7 for the diabetic group. Mean CT in the control group was 200.6±84.2μm and in the diabetic groups: no-DR 223.9±52.4μm; NPDR 181.1±73.1μm; NPDR+DME 186.4±61.1μm; PDR 151.6±47.5μm. Mean CT (β=40.9, p=0.046) and central CT (β=50.0, p=0.026) were significantly thinner in PDR as compared to control eyes in the univariate analysis. After adjusting for age, sex and spherical equivalent, mean CT (β=42.9, p=0.022) and central CT (β=50.2, p=0.013) were significantly lower in the PDR group compared to the control group. The same was observed for central CT (p=0.003) when comparing PDR eyes to diabetic eyes without DR after adjusting for the same confounders. Adjusting for age, the presence of any degree of DR (compared to diabetic eyes without DR) was significantly associated with a decreased central CT (β=36.2, p=0.009).

Conclusions: Deep choroidal imaging with OCT-SS revealed that macular CT is decreased in proliferative stages of DR compared to age-matched healthy controls and diabetic eyes without DR. Diabetic eyes with retinal lesions seem to present a thinner central macular choroid than those without any retinal signs of disease.