

Abstract

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Control group

Abstract:

Introduction: Ultra-wide-field optical coherence tomography (UWF-OCT) has been relatively recently introduced into clinical ophthalmology practice. To date, few reports have been published on the reference values of retinal thickness (RT) and choroidal thickness (CT) measured with this technique. The aim of the study was to analyze the variance of RT and CT in healthy Caucasian eyes in UWF-OCT, performed using the largest available scan size of 23×20 mm.

Methods: The study included 75 consecutive Caucasian patients admitted to an outpatient eye clinic. All patients underwent a routine ophthalmological examination. A total of 125 healthy eyes were included in the study. Patients with retinal and/or choroidal diseases that could affect or prevent the measurements were excluded from the study. Measurements were performed according to the sector division provided in the Xephilio device software. Each scan was evaluated individually, and its centration was manually corrected as needed. The results of measurements of adjacent fields were added to represent the analysis of larger retinal areas. A total of nine sectors were analyzed: central, supero-nasal (SN), supero-temporal (ST), infero-temporal (IT), infero-nasal (IN), peripheral supero-nasal (SNp), peripheral supero-temporal (STp), peripheral infero-temporal (ITp), and peripheral infero-nasal (INp). The central area refers to the central 3-mm circle; the SN, ST, IT, and IN areas are located between the central 3-mm circle and the larger 9-mm circle; the SNp, STp, ITp, and IN areas are located between the 9-mm circle and the 18-mm circle. Data were analyzed with respect to the age and sex of the patients and the axial length of the globe. Results: UWF-OCT scans allowed visualization of the retina and choroid shape over a large area of the globe. The retina and choroid are thickest in the central part, while becoming significantly thinner in the periphery. Peripheral CT was greater in the superior and temporal sectors; RT was higher in the nasal sectors compared to the temporal sectors. Both the choroid and retina showed decreased thickness with age. Greater CT in the central 3 mm region is positively correlated with retinal thickness in this region. Choroid thickness and retinal thickness decrease with age. Age-related thickness variation applies to both central and peripheral regions and is particularly evident in the choroid. The difference between central CT in patients younger than 40 years and in patients aged 80 years is about $100 \mu\text{m}$, which is almost 30% of the baseline value. In the case of the retina, such correlation is also significant, but less numerically evident. Choroidal and retinal thicknesses did not show a statistically significant correlation with axial length of the eyeball after adjustment for age and sex. In UWF-OCT, choroidal thickness was significantly greater in women, whereas retinal thickness was greater in men.

Conclusions: UWF-OCT provides additional information on the anatomical structure of the retina and choroid compared with OCT with a standard field of view.

DME group

Abstract:

Background: The goal of the study was to analyze variations in central, perifoveal, and peripheral retinal thickness (RT) and choroidal thickness (CT) in patients with diabetic macular edema (DME) measured with ultra-wide-field optical coherence tomography (UWF-OCT). Additionally, correlations between RT and CT in the central, perifoveal, and peripheral sectors and the presence of selected systemic factors were evaluated.

Methods: A total of 74 consecutive adult diabetic patients with DME and 75 healthy controls were included. Study participants were divided into three groups: DME patients without pan-retinal photocoagulation (PRP; 84 eyes), DME patients after PRP (56 eyes), and healthy controls (125 eyes). RT and CT were analyzed in three zones: a central circle of 3 mm diameter (central), a ring contained between a centered 9 mm circle and the central 3 mm circle (perifoveal), and a second, more peripheral ring between centered 18 mm and 9 mm circles (peripheral). Additionally, DME subgroups were analyzed according to the correlation of RT and CT with age, axial length, best corrected visual acuity (BCVA), diabetes duration, insulin therapy duration, body mass index (BMI), glycosylated hemoglobin (HbA1c) values, intravitreal injection (IVI) count, and the advancement of retinopathy assessed by the simplified diabetic retinopathy severity scale (DRSS).

Results: The increase in RT in the far peripheral sectors in DME patients was not significant. The increases in central and perifoveal RT and CT in PRP-naïve DME patients were strongly associated with poorer BCVA. Patients with DME after PRP presented with BCVA improvements significantly related to the number of IVIs. The amount of DME and RT in peripheral sectors were both independent of systemic factors such as BMI, duration of diabetes, duration of insulin intake, retinopathy severity, and HbA1c levels.

Conclusions: Peripheral retinal sectors in DME patients are less affected in terms of increase in their thickness compared to central ones. Functional and morphological associations of DME with UWF-OCT testing refer to central and perifoveal sectors.