Medical Retina

COMPARISON OF FLUID VOLUMES IN THE FOUR MOST FREQUENTLY USED OCT DEVICES IN NEOVASCULAR AGE-RELATED MACULAR DEGENERATION

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Purpose: Treatment decisions in neovascular age-related macular degeneration (nAMD) are mainly based on qualitative and subjective macular structure evaluation in optical coherence tomography (OCT). The purpose of this prospective, cross-sectional study was a comparison of the qualitative and quantitative differences between OCT devices in real-world data management of nAMD.

Methods: Four OCT volumes from patients with nAMD were acquired on the same day: 1. Spectralis Heidelberg HRA + OCT (SP, Heidelberg Engineering; Germany), 2. Cirrus HD-OCT (CR, Carl Zeiss Meditec, CA), 3. Topcon 3D OCT-1 Maestro2 (MA, Topcon, Japan) and 4. Topcon Triton DRI OCT (TR, Topcon, Japan). Intraretinal fluid (IRF), subretinal fluid (SRF) and pigment epithelial detachment (PED) were segmented by the Fluid Monitor Version 2 (RetInSight, Vienna) and manually corrected in all devices (Figure 1). Fluid volumes of IRF, SRF and PED were quantified in nanoliters (nl) and graphically analysed with boxplots (Figure 2). Differences of means (dM) of IRF, SRF, PED volume and total-fluid-volume (TFV) were compared in Bland-Altman plots in the central 6mm. Friedman tests with pairwise comparisons were performed to test for significant differences in IRF, SRF and PED volumes and TFV.

Results: 160 OCT volumes from 40 eyes of 40 patients were included. For IRF, the highest dM was measured between MAE-SP (-22nl), CR-SP (-21nl) and TR-SP (-16nl). IRF volume differed significantly between CR-SP in the central 3mm (p=0.01). For SRF, the highest dM was calculated between CR-MA (8nl), MA-SP (-7nl) and CR-TR (5nl) without any significant differences. SRF and IRF volumes did not differ significantly between any device in the central 1mm. For PED, the highest dM was measured between TR-SP (-67nl), CR-SP (-57nl) and MA-SP (-43nl). Significant differences were calculated between TR-SP and MA-SP in the central 1mm (p0.001,p=0.04), TR-SP, CR-SP and MA-SP in the central 3mm (p0.001,p=0.01,p=0.04) and TR-SP and CR-SP in the central 6mm (p0.001,p=0.002).

Conclusions: Our analyses provide valuable insights into qualitative and quantitative fluid representation in the most commonly used OCT devices. Differences in fluid quantification are noted between instruments, however, not in the clinically relevant central 1mm. Precise fluid quantifications are important as ground truth for the development of clinical decision support systems.