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Conjunctival and Intrascleral Vasculatures Assessed Using Anterior-Segment Optical Coherence Tomography Angiography in Normal Eyes

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Abstract

Purpose: To investigate conjunctival and intrascleral vasculatures using anterior-segment (AS) optical coherence tomography angiography (OCTA) in normal eyes.

Design: Cross-sectional study.

Methods: AS-OCTA images of the corneal limbus were acquired circumferentially using a swept-source OCT system in 10 eyes of 10 healthy subjects. AS-OCTA flow patterns with en face maximum projection were compared between the superficial (from the conjunctival epithelium to a depth of 200 μm) and deep (from a depth of 200 μm to 1000 μm) layers. The OCTA images were also compared with fluorescein scleral angiography and indocyanine green aqueous angiography images. Quantitative parameters (vessel density, vessel length density, vessel diameter index, and fractal dimension) were compared among different locations.

Results: The OCTA vessel patterns differed between the superficial and deep layers. The superficial-layer flow signals showed centrifugal patterns from the limbus, whereas the deep-layer flow signals showed segmental patterns. The OCTA en face images with whole signals had a similar appearance to the scleral angiography images, whereas those in the deep layer showed a similar appearance to the aqueous angiography images. In the superficial layer, only the vessel diameter index was significantly different among the locations ($P = 0.003$). In the deep layer, all four parameters differed significantly among the locations ($P < 0.001$ to $P = 0.003$).

Conclusions: OCTA is a promising tool for evaluating conjunctival and intrascleral vasculatures. It may also help in understanding ocular surface blood flow relevant to vascular and ocular surface diseases, as well as aqueous humor outflow.