

Comparison of dual 15x15 optical coherence tomography montage with fluorescein angiography fundus image on diabetic retinopathy patients

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PURPOSE

- While conventional color fundus photography covers a wide area of the retina with a typical 90 deg field of view (FOV), fluorescein angiography (FA) is an invasive test that requires intravenous administration of dye.
- In comparison, optical coherence tomography angiography (OCTA) is a non-invasive imaging modality, however the FOV covered by OCTA imaging has remained limited in comparison with conventional fundus photography.
- In this study, we compare clinical features present in the angiogram of diabetic retinopathy (DR) eyes obtained from 3D registration of two 15x15 mm OCTA scans acquired at nasal and temporal fixation with FA images.

METHODS

- Two diabetic eyes were imaged on a CLARUS™ 700 (ZEISS, Dublin, CA) instrument using FA and on a PLEX® Elite 9000 (ZEISS, Dublin, CA) prototype instrument using the dual 15x15 volumetric montage protocol.
- A series of 90 deg FA images were acquired on CLARUS, while 2 individual 15x15 mm angio scans centered at nasal and temporal fixations were acquired on PLEX Elite.
- The individual 15x15 OCTA volumes were then registered such as to produce a 3D montaged scan covering a FOV of approximately 85 deg (temporal to nasal) by 50 deg (superior to inferior).
- Clinical features present in the angiograms were compared between the 2 imaging modalities.

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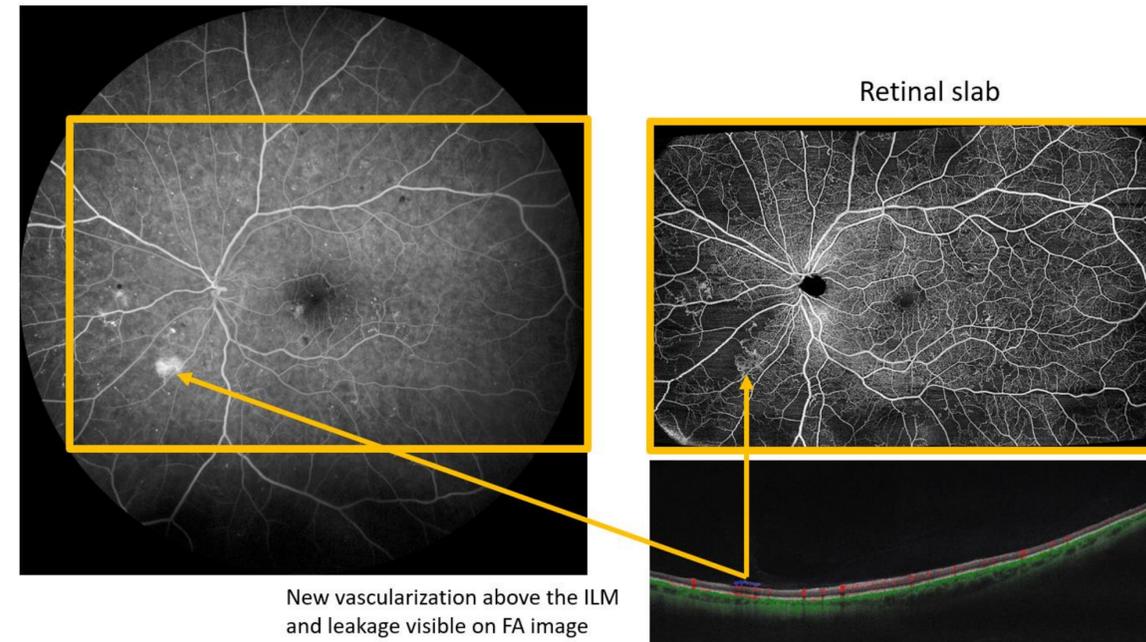
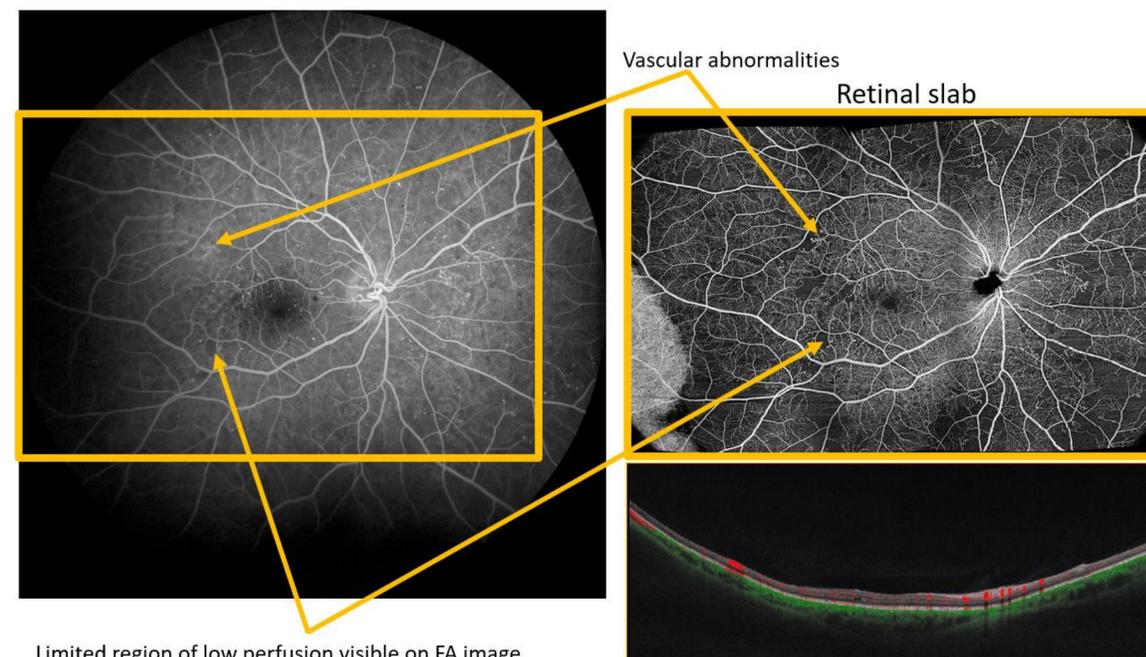


Figure 1: Moderate PDR – FA late-stage image (left) and corresponding OCTA retinal slab and central B-scan (right)



Limited region of low perfusion visible on FA image

Figure 2: Severe PDR – FA late-stage image (left) and corresponding OCTA retinal slab and central B-scan (right)

RESULTS

- Both imaging modalities revealed new vascularization (Figure 1) on an eye with moderate proliferative diabetic retinopathy (PDR).
- Leakage from pre-retinal vessels was observed on the FA image but their localizations above the ILM could only be revealed from the OCTA B-scans.
- Microaneurysms were better appreciated on the FA image, however regions of capillary dropout were clearly identified on the OCTA retina slab image and unresolved on the FA image.
- On another eye (Figure 2) with severe PDR, vascular abnormalities were seen on both imaging modalities but with a higher contrast on the OCTA retinal slab image.
- Regions of capillary dropout were clearly identified on the OCTA retinal slab image while remaining undetected on the FA image.

CONCLUSIONS

- Fluorescein angiography remains the best imaging modality to visualize microaneurysms, however OCTA is able to resolve low perfused areas that could otherwise remain undetected with fluorescein angiography.
- With OCTA scans approaching the FOV of fundus photography, the strength of these 2 imaging modalities are complementary in the early detection of retinal vascular abnormalities.