



Type 3 Neovascularization Visualized with AngioVue OCT Angiography

AngioVue OCTA is both diagnostic and predictive



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Type 3 neovascularization (T3NV) is an unusual form of neovascular age-related macular degeneration associated with drusen and pigment epithelium detachment (PED). It may arise from de novo breaks in Bruch's membrane (1,2), from focal neovascular proliferation in the deep capillary plexus (1,2,3,4) and from Type 1 macular neovascular membranes (1,2,5). These diverse origins are reflected in a confused history: the lesion has previously been classified as chorio-retinal anastomosis (5) and retinal angiomatous proliferation (3).

Precise details of T3NV's etiology only became clear with the advent of optical coherence tomography angiography (OCTA). OCTA reveals that T3NV is typified by a retino-retinal anastomosis that originates in the deep capillary plexus and forms a high-flow, tuft-shaped lesion in the outer retina. The anastomosis may extend into the sub-RPE space, as indicated by a small glomerular lesion ("clew-like lesion" [6]). The exact location of anastomosis-related flow can be determined by application of OCTA 3D projection artefact removal (3D PAR) to the corresponding B-scan. Thus, OCTA technology both confirms that early T3NV is characterized by an intraretinal vascular complex originating from the deep capillary plexus (6,7), and also, via B scan analysis, provides important information on flow characteristics (for example, vertical or intraretinal).

Our case study (Figure 1) concerns an 87-year-old patient with treatment-naïve T3NV. Fluorescein angiography and indocyanine green angiography (ICGA) reveal a hyperfluorescent lesion (white arrow) at the border of the foveal vascular zone (upper left panels). SD-OCT (upper right) confirms the presence of a hyper-reflective

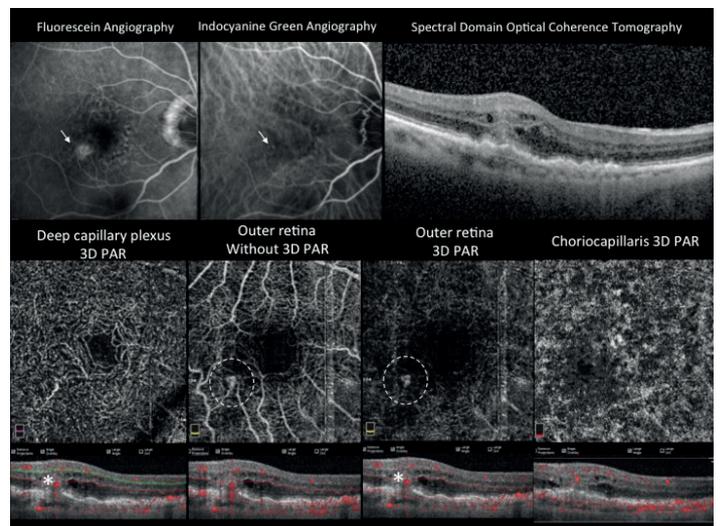


Figure 1. Case study: 87-year-old patient with treatment-naïve Type 3 neovascularization

Figure 1. Upper panels: Fluorescein angiography and ICGA indicate the presence of a hyperfluorescent/hyper-reflective region, confirmed by SD-OCT. Lower panels: OCTA-3D PAR identifies genuine intraretinal flow (originating in deep capillary plexus) from sub-RPE imaging artefacts.

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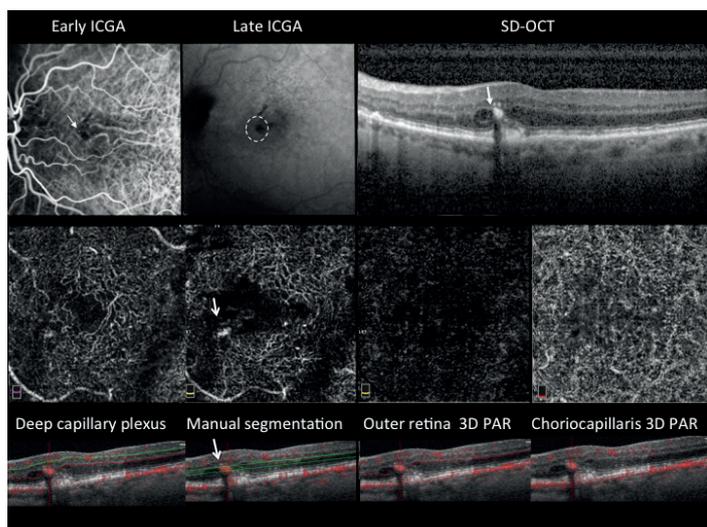


Figure 2: Case study: Multimodal imaging of eye of 82-year-old patient

Figure 2. OCTA B scan overlays can reveal a flow associated with an intraretinal hyper-reflective focus above a drusenoid PED. This finding was vindicated by onset of clinical Type 3 neovascularization, months later, at the exact location of flow.

intraretinal complex, accompanied by intraretinal fluid. OCTA /3D PAR of the deep capillary plexus shows a high-flow vessel extending to the outer retina and forming a tuft-shaped lesion (dashed circle and with 3D PAR). The choriocapillaris OCTA, however, does not disclose a corresponding high flow lesion. Thus, the OCTA B-scan with 3D PAR distinguishes genuine intraretinal T3NV flow from an imaging artefact, which (in the absence of 3D PAR) appeared connected to the sub-RPE space. Thus, OCTA correctly demonstrated that this patient's T3NV originated from the deep capillary plexus, without any connection to the sub-RPE space.

OCTA B-scan with flow overlay can also disclose flows associated with intraretinal hyper-reflective foci located above the drusenoid PED (Figure 2). ICGA of the left eye of an 82-year-old patient indicated a hyperfluorescent lesion on the border of the foveal avascular zone in early frames (white arrow, upper left panel) but not later frames (dashed white circle). SD-OCT (upper right) revealed a hyper-reflective

intraretinal focus (white arrow), in contact with a drusenoid PED, accompanied by minimal intraretinal fluid. With OCTA 3D PAR (lower panels), deep capillary plexus segmentation did not reveal any abnormalities. Manual segmentation through the hyper-reflective focus, however, revealed a small high flow lesion on both the 'en face' image (white arrow) and the corresponding B-scan flow overlay (lower left middle panel, white arrow). Nevertheless, outer retina segmentation did not reveal any tuft-shaped lesion. Similarly, choriocapillaris segmentation did not disclose any corresponding high flow lesion, and the corresponding B-scan flow overlay indicated only the small hyper-reflective focus unconnected to the sub-RPE space. Several months later, however, this patient developed clinical T3NV, accompanied by exudation, situated at the exact location of the previously seen hyper-reflective focus (7).

These case study data clearly show the diagnostic and predictive benefit of advanced OCTA imaging systems.

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