

Optical coherence tomography angiography changes in early type 3 neovascularization after anti-VEGF treatment

Alexandra Miere, MD (1), Giuseppe Querques, MD, PhD (2), Oudy Semoun, MD (1), Francesca Amoroso, MD (1), Olivia Zambrowski, MD (1), Thibaut Chapron, MD (1), Vittorio Capuano, MD (1), Eric H Souied, MD, PhD(1)

(1) Retina Créteil, University Paris Est Créteil, Créteil, France

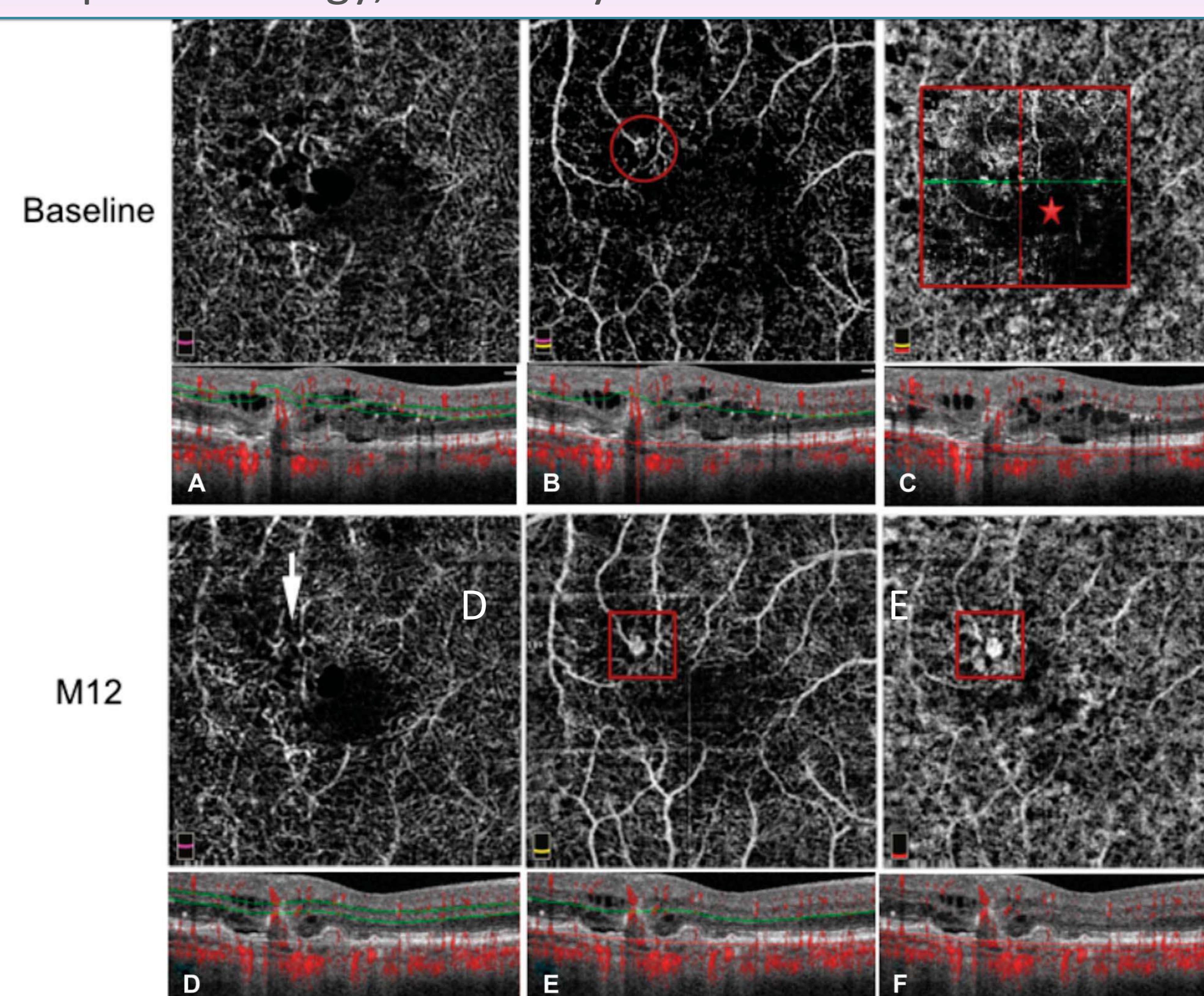
(2) Department of Ophthalmology, University Scientific Institute San Raffaele, Milan, Italy

Purpose: To investigate the morphological changes on optical coherence tomography angiography (OCTA) of treatment naïve type 3 neovascularization secondary to exudative age-related macular degeneration (AMD) after one year of anti-vascular endothelial growth factor (VEGF) therapy.

Methods: Consecutive patients diagnosed with treatment-naïve early-stage type 3 neovascularization were enrolled in this retrospective study. All patients underwent color fundus photographs / MultiColor® (Heidelberg Engineering, Heidelberg, Germany) imaging, fluorescein angiography (FA), indocyanine green angiography (ICGA), structural spectral-domain (SD)-OCT, and OCTA Optovue RTVue® XR Avanti (Optovue, Fremont, California, USA) at baseline, and repeated OCTA and structural SD-OCT at month 12. Qualitative analysis of the 3x3 OCTA examinations at baseline and month 12 were then compared, in order to assess changes after anti-VEGF therapy.

Results: A total of 15 treatment-naïve eyes of 15 consecutive patients were included in the analysis. At 12 months follow-up after pro-re-data anti-VEGF therapy (5.75±1.48 injections of Ranibizumab, and injections of 6.33±1.21 of Aflibercept), OCTA demonstrated persistence of the deep capillary plexus abnormalities in 13/15 eyes. In the outer retina and choriocapillaris the initial lesion became undetectable in 7/15 cases, accompanied by choriocapillaris atrophy. The abnormal vascular complex persisted in the form of a tuft-shaped lesion in the outer retinal segmentation in 9/15 eyes, which in the choriocapillaris segmentation was associated with sub-RPE neovascularization in 8 cases.

	Eyes n (*)	BCVA Baseline (letters)	BVCA Month 12	P-value*
Tuft-shaped lesion	15	57.2 ± 7.0	63.33 ± 6.99	p=0.002
Clew like lesion	11	55.0 ± 7.6	61.81 ± 7.15	p=0.01
Small caliber connecting vessel*	3	53.3 ± 4.7	66.66 ± 53.33	p=0.17
Sub-RPE neovascularization	8	56.2 ± 8.9	66.2 ± 5.4	p=0.02
Lesion disappearance	7	56.4 ± 7.4	59.0 ± 7.7	p=0.2



One year OCT-Angiography follow up after antiangiogenic therapy of the right eye of a 81 years-old woman diagnosed with type 3 neovascularization. Each row represents a visit (top panels: baseline, lower panels: month 12). Each column represents images of a specific segmentation on 3x3-mm OCT-Angiography (OCTA) and their corresponding OCT B-scan with overlaid flow. Note at baseline the tuft-shaped, high flow lesion appearing in the outer retinal layers (red circle, Panel B), characterized by a retinal-retinal anastomosis. Magnification on the choriocapillaris segmentation (red square, Panel C) reveals a deeper small clew-like flow signal, which seems connected with the choroid through a small caliber vessel (red star). Month 12: Note the persistence of the deep capillary plexus feeder vessels (white arrow, Panel D) dragging into the outer retina to form a well delimited, round, tuft-shaped lesion (red square, Panel E), abutting in the choriocapillaris segmentation, where it forms a round, high flow lesion, strongly suggestive for sub-RPE neovascularisation (red square, Panel F).

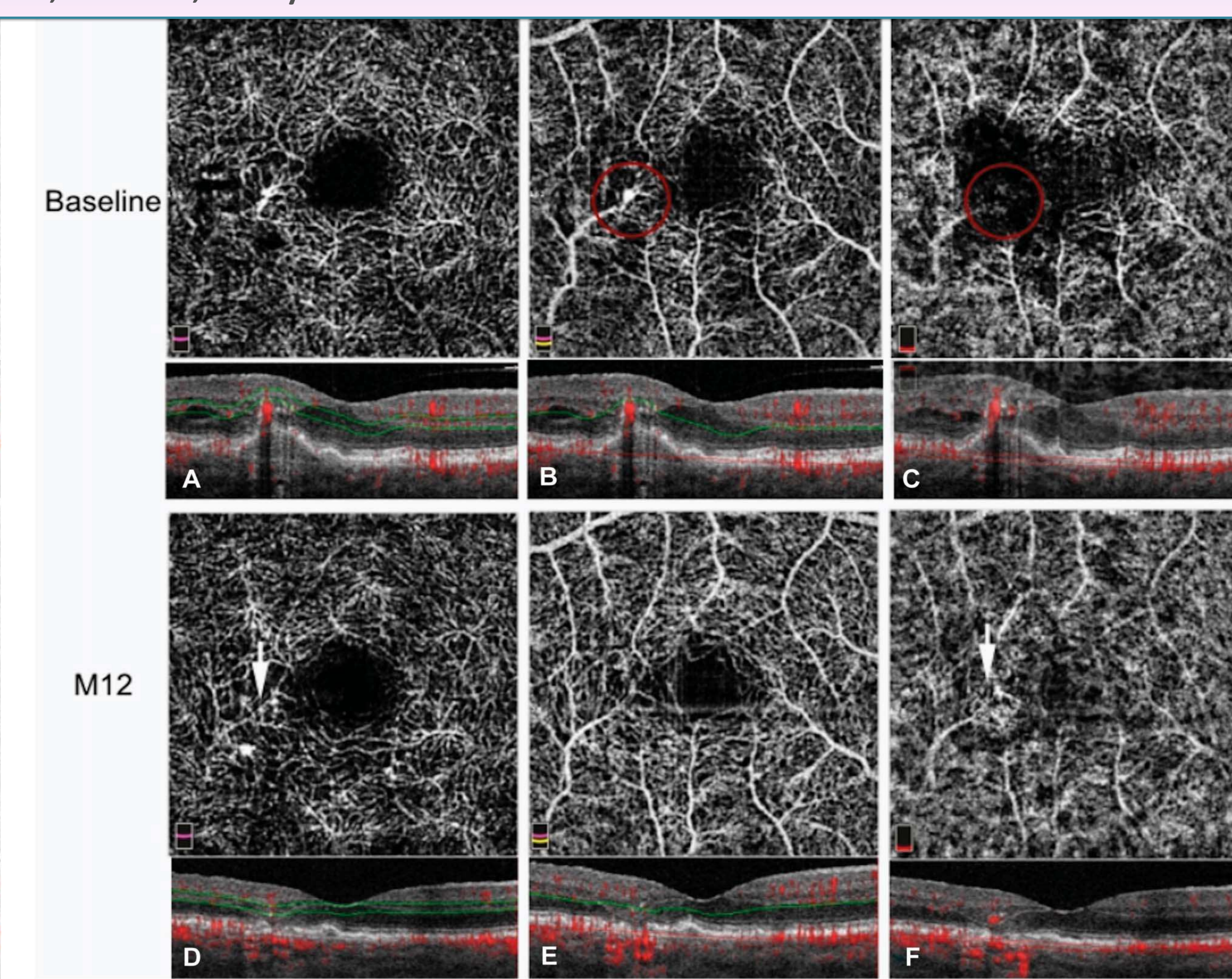
Table: Anatomical and functional changes during 12 months follow up in 15 treatment-naïve type 3 neovascularization treated by anti-VEGF intravitreal injections.

*Wilcoxon paired test

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One year OCT-Angiography follow up after antiangiogenic therapy of the right eye of a 82 years-old man diagnosed with type 3 neovascularization. Each row represents a visit (top panels: baseline, lower panels: month 12). Each column represents images of a specific segmentation on 3x3-mm OCT-Angiography (OCTA) and their corresponding OCT B-scan with overlaid flow. Note at baseline the tuft-shaped, high flow lesion appearing in the outer retinal layers (red circle, Panel B), characterized by a retinal-retinal anastomosis and abutting into the sub-RPE space, forming a small clew-like flow signal in the choriocapillaris (red circle, Panel C). Month 12: Note the persistence of the deep capillary plexus high flow feeder vessel (arrow, Panel D). In the outer retinal layers (Panel E) and in the choriocapillaris segmentation (Panel F) the initial lesion becomes undetectable, being replaced in the choriocapillaris by an area of focal atrophy (white arrow, Panel F).

Conclusion: OCTA showed that the tuft-shaped abnormal outer retinal lesion, frequently associated to a small clew-like flow signal in the choriocapillaris, after 1 year of anti-VEGF therapy, either becomes undetectable or develops sub-RPE neovascularization.