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MULTIMODAL IMAGING FEATURES OF RETINAL NEOVASCULARIZATIONS (NVS) IN PROLIFERATIVE DIABETIC RETINOPATHY (PDR) IN RESPONSE TO 3 ANTI-VEGF INJECTIONS

Oral

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Purpose:

Many studies have classified retinal NVs in PDR considering their imaging features, while other studies have analyzed their response to single intravitreal injections (IVI) of anti-VEGF. We analyzed longitudinal changes of different types of retinal NVs in eyes with PDR in response to three monthly anti-VEGF IVI using multimodal imaging.

Methods:

Prospective, monocentric study conducted at Luigi Sacco Hospital, Milan University. Consecutive patients with PDR and no previous ocular treatments were enrolled. All patients underwent Color Fundus Photography, Fluorescein Angiography, Spectral-Domain Optical Coherence Tomography (SD-OCT) and OCT-Angiography. After 3 monthly IVI of Ranibizumab, the patient was evaluated again using the same imaging modalities. NVs were classified as flat, forward, flat-forward or table-top. The entity of regression was graded as partial or complete. Area, perimeter, vessel density, leakage, vitreous state over the NVs, the presence of pre-retinal hemorrhages and intra-vitreal hyper-reflective dots were evaluated at baseline and in response to therapy.

Results:

A total number of 36 NVs in 8 patients were studied. A partial regression of the NVs was observed in 66.7% of cases and a complete regression in 33.3% of cases after treatment. Table-top NVs demonstrated more frequently a complete regression($p=0.03$). A significative reduction of the NV area, perimeter and VD was observed after treatment($p<0.001$). Flat NVs had more frequently a complete vitreous attachment while table-top showed more often a focal attachment($p<0.05$). A complete regression was more often observed for NVs with a focal vitreous attachment at baseline(10/12), most of NVs with a complete vitreous attachment showed a partial regression(18/24)($p<0.001$).

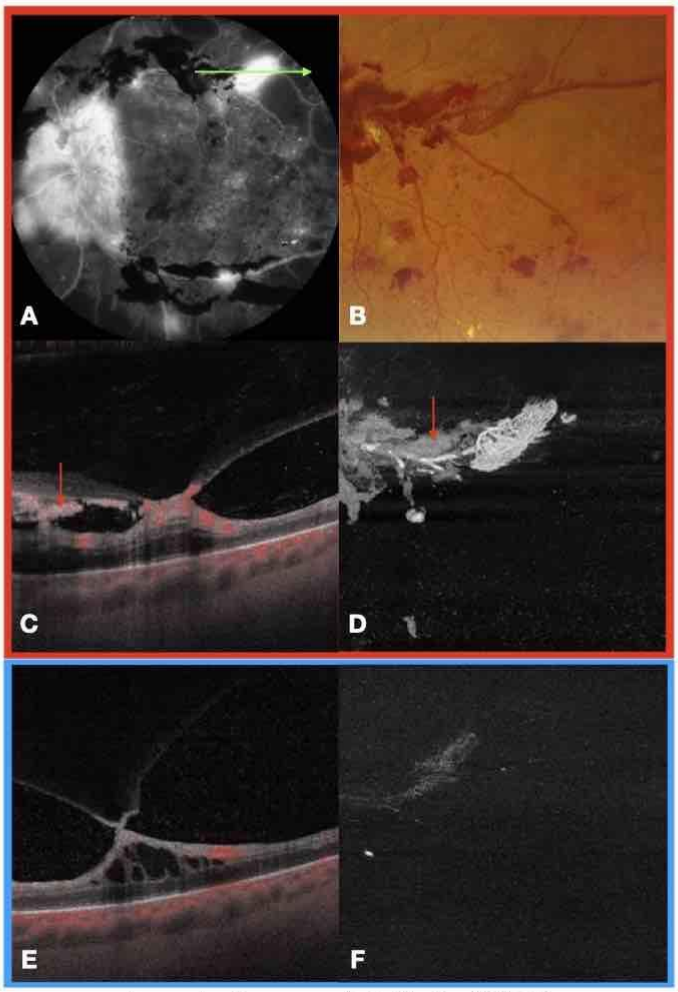
Conclusions:

Flat NVs had more frequently a complete vitreous attachment over the NV and more often showed a partial regression after treatment. On the contrary, table-top NVs had more frequently a focal attachment of the vitreous and demonstrated more often a complete regression of thee NV after therapy.

Table 1. Neovessels characteristics

	Flat	Forward	Flat-Forward	Table-Top	Total	p value
Neovessel n° (%)	15 (42)	4 (11)	9 (25)	8 (22)	36 (100)	
Partial regression n° (%)	11 (73.3)	3 (75)	8 (88.9)	2 (25)	24 (66.7)	**0.03¶**
Complete regression n° (%)	4 (26.7)	1 (25)	1 (11.1)	6 (75)	12 (33.3)	
Area Baseline Median mm² (IQR)	1 (0.4, 2.8)	0.5 (0.3, 1.1)	2.5 (1.9, 3.7)	7.4 (2.1, 8.8)	2 (0.6, 3.9)	**<0.001 ***
Area 3 Months Median mm² (IQR)	0.6 (0.3, 1.8)	0.4 (0.3, 0.7)	2 (1.4, 3.1)	3.2 (1.2, 5.5)	1.4 (0.4, 2.7)	
Area Change Mean mm² (SD)	0.45 (0.50)	0.25 (0.43)	0.68 (0.40)	3.91 (5.01)	1.26 (2.69)	**0.01 #**
Perimeter Baseline mm (IQR)	5.4 (3.3, 11.4)	4.5 (3.3, 6.9)	10.7 (10.3, 17.8)	17.2 (12.3, 21.5)	10.2 (5.2, 14.6)	**<0.001 ***
Perimeter 3 Months mm (IQR)	5.2 (0.3, 9.8)	3.9 (0.3, 5.5)	10.1 (1.4, 13.4)	11.5 (1.2, 15.6)	7.9 (0.4, 11.9)	
Perimeter Change Mean mm² (SD)	1.25 (2.55)	0.97 (0.86)	1.90 (1.22)	4.47 (4.06)	2.10 (2.84)	**0.016 #**
Vessel Density Baseline Mean (SD)	46.8 (17.9)	28.1 (8.7)	32.9 (12.3)	35.8 (10.3)	$	**<0.001 §**
Vessel Density 3 Months Mean (SD)	15 (10.7)	15.4 (4.3)	16.8 (8.9)	8.3 (9.2)	14 (9.6)	
VD Change Mean (SD)	31.81 (24.26)	12.64 (6.62)	16.09 (14.33)	27.54 (8.68)	24.80 (8.98)	0.32 #

¶Fisher's exact test; **Wilcoxon signed rank exact test* referred to the total; * ANOVA analysis referred to all the subgroups; §*Paired t-test* referred to the total



Example of response to 3 IVI of anti-VEGF

Retinal neovessel (NV) detected using fluorescein angiography (A). The same NV is well seen on color fungus photography (B). The corresponding B-scan OCT (C) and OCT-Angiography (D) show a clear flow signal with visualization of the NV architecture. Pre-retinal hemorrhage (red arrow) create a false flow signal and are visualized on enface OCT-A as a grayish halo. After treatment, B-scan and enface OCT-A show any detectable remaining NV (E,F).