

Qualitative and Quantitative Follow-up of Patients with Retinal Vein Occlusion using Optical Coherence Tomography Angiography

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INTRODUCTION

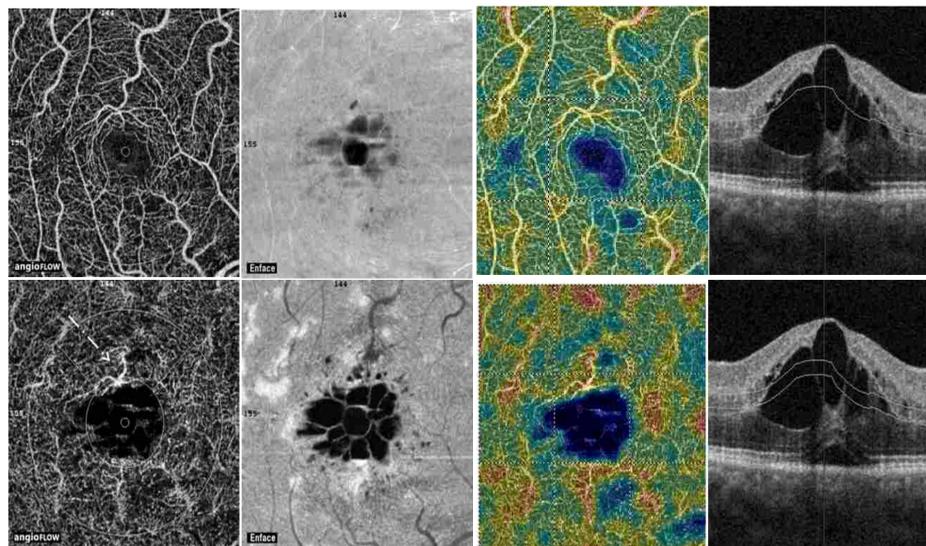
To evaluate qualitatively and quantitatively the results using Optical Coherence Tomography Angiography (OCTA) in the follow-up of patients treated with intravitreal injections for macular edema secondary to retinal vein occlusion (RVO).

METHODS

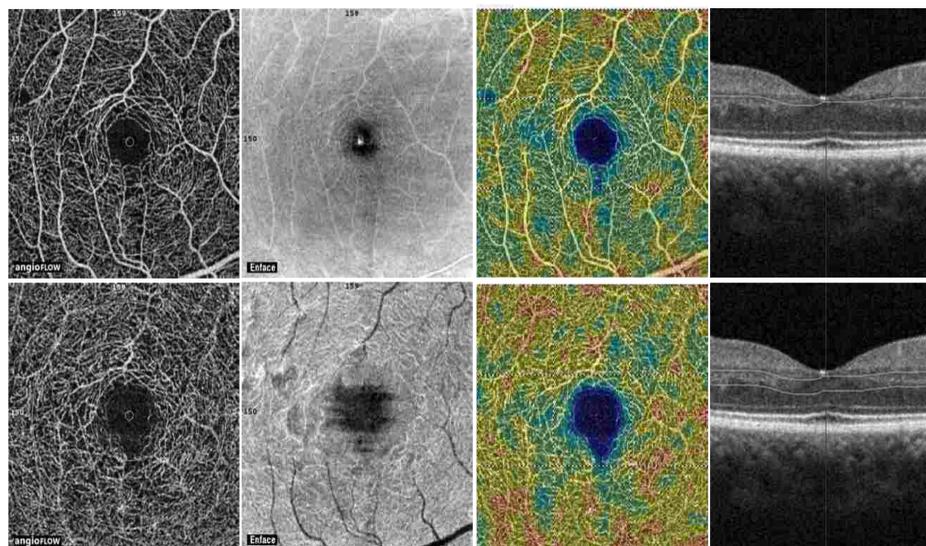
- Retrospective study of RVO patients treated with intravitreal injections for macular edema.
- Before and after injection, following data were recorded: best-corrected visual acuity (BCVA), SD-OCT, fluorescein angiography and OCT A (Optovue, Inc., Fremont, California, USA).
- Automatic measurement of vascular density of the superficial (SCP) and deep capillary plexus (DCP) was also done before and after treatment and compared to healthy subjects, matched for age and gender.

RESULTS

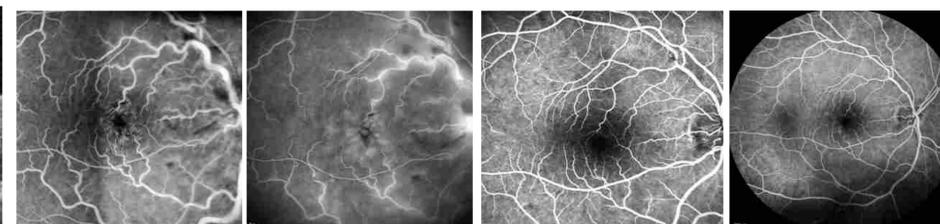
- 35 eyes of 34 patients (mean age, 68 years, male 63%) 16 central RVO, 15 branch RVO and 4 hemicentral RVO.
- After treatment, central macular thickness decreased from 623 μ to 326 μ .
- BCVA increased from 20/100 to 20/63 ($p < 0.01$ for both).
- On OCTA:
 - Decrease of perifoveal capillary disruption was observed after treatment ($p=0.02$).
 - Decrease of vascular dilation in the SCP and the DCP ($p=0.001$ and 0.016 respectively).
 - Decrease of the number of cysts in the SCP and DCP ($p<0.001$ for both).
- At the SCP, the mean whole en face vascular density slightly decreased during follow-up from 45.7 to 44.5%, (non-significant difference).
- These densities were largely inferior to those observed in control subjects (45.6% vs. 52.2% for the SCP and 47.8% vs. 57.6% for the DCP, $p<0.001$ for both).



Optical coherence tomography Angiography of the superficial and deep capillary plexuses of a 45 years old male with central retinal vein occlusion (BCVA: 20/80).
 At the superficial capillary plexus level (top) : focal foveal capillary arcade disruption in the infero-nasal part (top left); "En face" Optical Coherence Tomography shows dark central cysts (top middle left); Virtual colored macular vessel density map shows predominant lack of vessels in the infero-nasal quadrant, with whole en face density of 50.63%. Dark blue to light blue areas indicate areas of no flow to low flow density, green indicates an area of medium flow density, yellow indicates medium-high flow density, and red indicates high flow density (top middle right); SD-OCT shows the place of segmentation at the superficial capillary plexus level (top right);
 At the deep capillary plexus (bottom), there is dilation of superior macular capillaries with hyper signal (white dashed arrow) (bottom left); "En face" OCT shows numerous central and paracentral dark cysts (bottom middle left);
 On the virtual colored macular vessel density map, the low perfusion area appears to be larger and the whole en face density is 51.64% (bottom middle right);



Optical coherence tomography Angiography after aflibercept injection (same patient as in Figure 1) at the superficial (top) and deep capillary plexus (bottom) levels.
 At the superficial capillary plexus, ETDRS grid on 10° central macula, shows the complete absence of dark cysts and an intact perifoveal capillary arcade (top left); "En face" Optical Coherence Tomography shows the complete disappearance of central cysts (top middle left);
 On virtual colored macular vessel density map, all perfusion areas appear normal and whole en face density (51.47%) was increased (top middle right);
 Optical Coherence Tomography shows the place of segmentation at the superficial capillary plexus (top and bottom right);
 In the deep capillary plexus, there is an absence of dark cysts and persistence of focal capillary dropout in the inferior part of the fovea;
 "En face" Optical Coherence Tomography shows the absence of central cystoid edema (bottom middle left);
 Virtual colored macular vessel density map shows the disappearance of almost the whole area of capillary dropout observed before treatment (except in the inferior part) with increased whole en face density to 55.63% (bottom middle right);



Fluorescein Angiography of the same patient before (left) and after treatment (right) by intravitreal injection of Aflibercept

CONCLUSION

Along with the disappearance of macular edema and of macular cysts, OCTA showed a slight decrease in mean macular vascular density with time and despite treatment. This technique enables a quantitative and qualitative evaluation of the follow-up of RVO patients, particularly useful to analyze both macular edema and vascular perfusion.

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