Evaluating the Response of Type 1 Choroidal Neovascular Membrane in Neovascular Age-Related Macular Degeneration to Anti-VEGF Treatment by Optical Coherence Tomography Angiography

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Objective:
To observe the vascular response to anti-VEGF treatment in neovascular ARMD with type 1 CNV by OCT angiography (OCTA)

Design:
Consecutive observational case series

Material and Methods:
Retrospective review of SSADA based OCTA on patients received anti-VEGF treatment in neovascular ARMD with type 1 CNV. A standard FA was obtained by a digital camera angiography. OCT images obtained by a 70 kHz wide angle Spectral Domain (SD)-OCT system with Optovue Avanti RTVue XR SD-OCT (Fremont, CA), and OCTA images captured by the same SD-OCT equipment with the light source of 840nm were reviewed. The AngioVue and AngioAnalytics software were used to detect and calculate the flow of the CNVs in both 3x3mm and 6x6mm areas. Motion correction processing was applied while each scan was obtained. The 3D angiography was reviewed and segmented with the default setting of superficial retinal, deep retinal, outer retinal and choroidal capillary slabs. Manual segmentation to adjust the segmentation plan was applied whenever needed.

Results:
37 eyes with type 1 CNV were treated with various anti-VEGF agents. Among them, 10 remained partially active and 7 were refractory to treatment. 10 were responsive with temporary inactive, and 10 had permanent remission after treatment. The OCTA detected blood flow in all types of CNV. In active CNV, the size and vascular volume of CNV varied. The size of CNV was smaller in active and temporary inactive CNVs than in refractory CNVs. The CNV responded to anti-VEGF treatment by partial closure of peripheral vascular branches, but the main central core vascular trunk remained unaffected. Recurrent activity also involved mainly the periphery. In refractory CNV, weekly OCTA showed none to minimal vascular responses. In quiescent CNV, flow change analysis showed a steady vascular flow pattern without changes.

Active CNV (10 eyes): Treated and partially active CNV. FA showed leakage, OCT showed intra- or sub-retinal fluid
Refractory CNV (7eyes): Refractory to monthly treatment with persistent exudation. FA showed persistent leakage and OCT showed intra- or subretinal fluid, frequently with RPED
Treated CNV with short term remission (10 eyes): Temporally respond to intracranial anti-VEGF treatment without exudation
Treated CNV with long term remission (10eyes): Treated and remain symptomless without leakage for greater than one year

Table 1: Types of vascular response to anti-VEGF treatment