Abstract: 1443

Change in the size of microaneurysm after intravitreal injection of anti-vascular endothelial growth factor agents in diabetic macular edema

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Purpose:
Intravitreal injection of anti-vascular endothelial growth factor (VEGF) agents reduces microaneurysms (MAs) in patients with diabetic macular edema (DME). However, residual MAs are present. It has been reported that there are anti-VEGF-resistant MAs. In this study, we investigate change in the size of MAs after intravitreal injection of anti-VEGF agents in DME, and examine anti-VEGF-resistant MAs.

Methods:
Indocyanine green angiography (IA), fluorescein angiography (FA), and optical coherence tomography (OCT, RS-3000) were performed before and 6 months after the intravitreal injection of anti-VEGF agents (pro re nata regimen after three monthly loading doses) in 7 eyes of 5 patients with DME. The number and size of MAs within the 6-mm diameter macular region of the edema were evaluated. The number of MAs was counted using images overlaid with IA, FA and OCT. The counted MAs were classified into those detected only with IA, those detected only with FA, and those detected with both IA and FA. The size of MAs was measured using the IA image overlaid on the OCT image. ImageJ software was used for image overlay and image analysis. Independent t-test was used for statistical analysis.

Results:
The total number of detected MAs was 242. After the intravitreal injection of anti-VEGF agents, the number of MAs decreased in all types of MA, those detected only with IA (from 3 to 2: 34%), those detected only with FA (from 42 to 40: 5%), and those detected with both IA and FA (from 197 to 58: 71%). The size of MAs was significantly smaller after the intravitreal injection of anti-VEGF agents (p=0.04). The size of MAs before the intravitreal injection of anti-VEGF agents was significantly smaller in those disappeared after the intravitreal injection than those remained (p=0.00029).

Conclusions:
Our results suggest that the smaller size MAs in DME are more likely to disappear after the intravitreal injection of anti-VEGF agents. We suggest that further therapeutic effect can be expected by using intravitreal injection of anti-VEGF agents and retinal photocoagulation therapy for the larger size MAs.