Prophylactic Treatment of Age-Related Maculopathy with 577-nm Subthreshold MicroPulse Laser

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History and examination
This case series includes 10 patients considered at high risk for progression to advanced age-related macular degeneration (AMD). All 10 had already been diagnosed with exudative (wet) AMD in one eye and displayed signs of age-related maculopathy (ARM) in the fellow eye. The patients ranged in age from 55 to 78 years old. Six were female and four were male.

On red-free fundus photographs, ARM was defined as the presence of more than 10 soft, yellow drusen, each ranging from 63 to 250 μm in greatest linear dimension. The pattern of drusen was scatter, subconfluent, or confluent. Drusen and focal hyperpigmentation were present within 2250 μm of the foveal center. No leakage was detected by optical coherence tomography and fluorescein angiography (FA).

Pre-treatment mean visual acuity (VA) was 0.2 logMAR (20/32 Snellen). Threshold macular sensitivity was measured by Oculus TwinField 2 10° macular threshold test. FA was performed in order to exclude the presence of choroidal neovascularization (CNV) and to determine the presence of threshold retinal pigment epithelium (RPE) damage after the procedure (Fig 1). The areas of drusen-induced RPE changes on color photo were identified and marked manually (Fig 2), and special software was used to determine the number of pixels. By estimating that the diameter of the peripapillary vein is 125 μm, the mean diameter of the veins at the edge of the optic nerve in each eye was measured in pixels. The following equation was used to calculate the area: Area in mm² = area in pixels X (0.125 mm/mean diameter of veins at the edge of optic nerve). Mean retinal area affected by drusen-induced RPE changes was 2.7 mm² (range 2.08 – 4.23 mm²).

Treatment
All treatments were performed with the IQ 577™ yellow laser (IRIDEX, Mountain View, CA). Patients received treatment under topical anesthesia. To determine the laser treatment power, we first applied a test spot to the retina, nasal to the optic nerve, using the laser in its continuous-wave (CW) mode, with 200 μm spot, 150 ms exposure duration, and titrating upward the power to produce a mild gray burn (powers ranged from 60 to 150 mW). To deliver subvisible, subthreshold treatment, we switched the laser to its MicroPulse™ mode, using a 15% duty cycle, doubled the power determined for the visible test burn, and maintained a 200 μm spot and a 150 ms exposure duration.

We delivered the subthreshold MicroPulse laser treatment in a confluent pattern over the drusen (avoiding the area less than 500 μm from the center of fovea) in the ARM eye of each patient. In each eye, 300-400 treatment spots were applied.

Results
After 12 months of follow-up, partial resolution of macular drusen was obtained in 7 of the 10 eyes (70%). The mean decrease of drusen area (software calculated) on color photos was 0.92 mm² (34%, p<0.05). There were no visible signs of laser treatment on FA performed immediately after the treatment. (Fig 1). Mean VA (0.2 logMar; 20/32 Snellen) did not change. In one patient, VA worsened to 0.6 logMAR (20/80 Snellen) due to cataract progression; in another it improved significantly to 0.00 logMAR (20/20 Snellen). Threshold macular sensitivity remained stable or increased in 9 of 10 eyes (90%) (Fig 3). In one eye, it decreased due to progression of cataract. None of the 10 eyes has progressed to advanced or exudative AMD.

Discussion and treatment pearls
Large confluent drusen in ARM are a risk factor for...
A 63-year-old male with AMD subretinal fibrosis VA 20/640 OD; VA of 20/40.

References