Visual field deficits with a multifocal intraocular lens

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An 84-year-old woman with Sjögren syndrome was evaluated for hydroxychloroquine toxicity. Surgical history was significant for cataract surgery with implantation of a multifocal intraocular lens (IOL) in the right eye and a monofocal IOL in the left eye. Examination revealed no retinal pigment epithelial or optic disc changes. However, on testing with the Humphrey Field Analyzer II 10-2 red III program, the visual field in the right eye showed generalized depression with central sparing and the visual field in the left eye exhibited nonspecific rim defects. Since further tests suggested factors other than the IOL type were apparently equal in both eyes, the multifocal IOL in the right eye may have contributed to the abnormal visual field testing. Further studies are needed to clarify whether multifocal IOLs are appropriate in patients with autoimmune disorders possibly affecting vision, such as Sjögren syndrome, and those requiring hydroxychloroquine use.

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CASE REPORT

An 84-year-old woman with a history of Sjögren syndrome was evaluated for hydroxychloroquine toxicity. She had used 200 mg of hydroxychloroquine twice daily for 20 years. Her only complaint was ocular dryness, which was consistent with a long-standing history of keratoconjunctivitis sicca, for which she had punctal cautery 25 years earlier. Other medications included topical cyclosporine twice daily and cevimeline for dry mouth. The surgical history was significant for cataract extraction in both eyes with implantation of a multifocal IOL (Tecnis ZMA00, Abbott Medical Optics, Inc.) in the right eye and a monofocal IOL (Tecnis ZCB00, Abbott Medical Optics, Inc.) in the left eye 1 year and 4 months prior to the current examination, respectively. Both procedures were uncomplicated.

The uncorrected distance visual acuity was 20/30 in the right eye and 20/25 in the left eye. The manifest refraction was plano +0.25 × 120 and −0.75 +0.25 × 35, respectively. The corrected distance visual acuity (CDVA) was 20/25 in the right eye and 20/20 in the left eye. The preoperative manifest refraction was −2.75 +1.50 × 180 and −3.25 +0.25 × 85, respectively.

At the time of the current examination, the intraocular pressure was 10 mm Hg in both eyes. The pupils were round and reactive without evidence of relative afferent pupillary defects. Tear break-up time was slightly decreased, but fluorescein staining revealed clear corneas bilaterally. The IOLs were well-centered with no evidence of misalignment or tilt. No significant posterior capsule opacification was evident in either eye. Fundoscopic examination showed no signs of retinal pigment epithelial changes and the vessels and periphery were normal. The optic discs were healthy and symmetrical with a cup-to-disc ratio of 0.3 in both eyes.

Central visual field detected with the 10-2 red III program on the Humphrey Field Analyzer II (Carl Zeiss Meditec AG) showed generalized depression with central sparing in the right eye and nonspecific rim defects in the left eye (Figure 1). The tests in both eyes were reliable and comparable in time of test duration. The lenses used during the testing were +3.25 diopter sphere. Repeat 10-2 testing showed similar results. Color vision tested with the Ishihara plates was full bilaterally. One month later, macular imaging with spectral-domain optical coherence tomography was normal in both eyes (Figure 2). Corneal topography was within normal limits in both eyes. Visual field testing prior to cataract surgery was not available for comparison, and contrast sensitivity testing was not performed.

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Few studies have investigated the effects of multifocal intraocular lenses (IOLs) on the results of visual field testing. We report a case demonstrating generalized depression on 10-2 automated perimetry testing in an apparently healthy pseudophakic eye with a multifocal IOL.

CASE REPORT
The most striking finding in this patient was the diffuse depression of the central 10-2 visual field in the right eye. Given the unremarkable funduscopic examination and macular imaging, retinal toxicity was ruled out. Dry eyes may lead to falsely decreased threshold readings on static perimetry. Our patient, however, did not demonstrate fluorescein staining at the time testing was done and both eyes had equal dry-eye symptoms and signs.

The patient was somewhat unique in that she had a multifocal IOL in the right eye and a monofocal IOL in the left eye. To our knowledge, this is the first report of generalized depression of the central visual field found with standardized automated perimetry in an eye with a multifocal IOL that was not detected in the other comparable eye with a monofocal IOL. In fact, 1 study showed that the visual field detected with the Octopus 101 autoperimeter was not statistically different between patients with Acrysof Restor multifocal IOLs and monofocal IOLs. Another study, however, demonstrated that as spot intensity and size during visual field testing were decreased, patients with multifocal IOLs experienced a greater decrease in visual field than in phakic patients and those with monofocal IOLs. This may be consistent with the degradation of image quality seen through multifocal IOLs due to reduced contrast sensitivity. A recent study showed multizone refractive multifocal contact lenses led to significant generalized depression of the mean deviation during 24-2 HVF white-on-white testing.

Further evidence of a potentially negative effect of multifocal IOLs on visual field testing was demonstrated by a cross-sectional case-control study using standard automated perimetry. On average, visual sensitivity was decreased by approximately 2 dB in patients with multifocal IOLs compared with phakic controls and 50% had results revealing a general reduction of sensitivity. Of particular relevance, analysis of the test locations within 10 degrees eccentricity also showed about a 2 dB reduction in mean sensitivity in patients with multifocal IOL compared to phakic patients.

Given that the workup did not reveal significant differences between the 2 eyes except in the type of IOL, the present case may be the first to demonstrate that...
a diffractive multifocal IOL may cause diffuse depression specifically during 10-2 Humphrey Field Analyzer testing using a red stimulus (equivalent to a dim white stimulus), which suggests that reduced contrast sensitivity may interfere with visual field testing. While this case report addresses the symmetry of this patient's keratoconjunctivitis sicca, it remains a confounding variable. Larger controlled studies are needed to assess whether multifocal IOL implantation in patients with autoimmune disorders requiring systemic hydroxychloroquine and visual field testing is appropriate.

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