New implant with trifocal optic may bridge intermediate vision gap

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The defocus curve does not exhibit the gap between –1 D and –2 D that is characteristic of other multifocal lenses.

A new, trifocal intraocular implant enables spectacle independence and good vision at all distances, including intermediate, according to a speaker.

"A unique feature of this new-concept multifocal lens is that it provides not only distance and near but also intermediate vision, the weak point of all multifocal implants so far," **Gilles Lesieur, MD,** said at the meeting of the French Society of Ophthalmology in Paris.

In standard multifocal implants, light is divided between two foci, one for far and one for near vision. Steps on the lens surface are arranged at varying heights and widths. The step height determines the repartition of light energy between the diffraction orders of 0 (far vision) and +1 (near vision), while the width of the steps determines the add power of the lens. There are more steps with the increase of add power. Distance vision power is fixed by the curvature of the lens, Dr. Lesieur said.

"These lenses are generally apodized," he said. "Apodization is a gradual reduction in diffractive step heights from center to periphery, with increased amount of energy directed to the far focus. Asphericity is another characteristic of these implants. This allows to compensate for cornea positive spherical aberrations in order to improve the depth of field and the contrast sensitivity.

There are two main problems inherent to the configuration of multifocal IOLs. The bimodal distribution of light leads to a reduction in quality of intermediate vision and to a loss of 18% to 20% of light energy, with consequent decrease in contrast sensitivity.

"This is clearly visible on the defocus curves of multifocal implants, where there is a gap between –1 D and –2 D," Dr. Lesieur said.

New implant technology

The new FineVision implant (PhysIOL), based on a design by Damien Gatinel, MD, PhD, has a trifocal optic combining in addition to a far focus for distance vision determined by the IOL curvature, a +3.50 D addition for near vision and a +1.75 D addition for intermediate vision. This leads to a more uniform distribution of light.

"Loss of light is reduced to 14%, and there is no longer a gap in the defocus curve, meaning that there is no drop in visual acuity at any distance. Intermediate vision is good as it is with no other lens, while sharp vision at distance and near is maintained, with no reduction of contrast sensitivity. The lens regains the light that other implants lose. It is the only implant that allows [us] to restore multifocality with an intermediate vision," Dr. Lesieur said.

Dr. Lesieur said he used the Acri.Lisa (Carl Zeiss Meditec) implant in the past and liked it very much, but it still required spectacles for computer work. With this new lens covering the entire range of vision, patient do not require spectacles at any distance, he said.

The FineVision IOL is an aspheric model with a curvature of -0.11 µm. A blue-blocking lens with yellow filter, it can be implanted through a 1.8-mm incision. It is a distance-dominant multifocal implant. The apodization on the entire optic increases the distance dominance with the opening of the pupil. It is particularly suitable for patients between the ages of 55 years and 65 years who want to correct presbyopia and are starting to develop cataract, according to Dr. Lesieur.

Study results

In a study, 20 eyes of 20 patients (cataract and refractive lens exchange) were implanted with the FineVision implant. Mean patient age was 60 years, and mean follow-up was 3 months. The study

participants had no associated pathologies and no astigmatism exceeding 1.0 D. Mean preoperative visual acuity was 20/28, while mean astigmatism was 0.79 D. Mean lens power was 22 D.

"Postoperative distance [visual acuity] increased to 20/20, both corrected and uncorrected, with normal pupil diameter in photopic conditions, 2.92 mm. Near and intermediate vision were between J2 and J1. The defocus curve was a continuum, with no gap," Dr. Lesieur said. – *by Michela Cimberle*

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Disclosures: Dr. Lesieur is a consultant for PhysIOL and Bausch+Lomb.

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