

DIFFRACTIVE MULTIFOCAL

Good results for vision at all distances with new lens in preliminary study

By Roibeard O'hEineachain in Prague

A new apodised diffractive multifocal IOL called the SeeLens MF (Hanita) can provide cataract patients with satisfactory near, intermediate and distance visual acuity and a high degree of spectacle independence, said Roberto Bellucci MD, Hospital and University of Verona, Italy.

“We think that this lens is promising, because it provided our patients with excellent visual acuity for distance and for near. Intermediate vision was also surprisingly high and the contrast sensitivity results are equivalent to the marketed IOLs, and independence from glasses was achieved despite small refractive errors,” Dr Bellucci told the 16th ESCRS Winter Meeting.

The new SeeLens MF is a hydrophilic acrylic aspheric IOL with apodised diffractive optics. The diameter of its optic is 6.0mm. The central 4.00mm of the optic provides a near add of +3.0 D at the lens plane, which is equivalent to about +2.4 D at the spectacle plane (Figure 1). The IOL's total length is 13.0mm and it can be implanted using an injector with a lumen 1.8mm in diameter, Dr Bellucci noted.

“The height of the steps determines how the light converges to the diffractive focus. The lens is apodised and pupil-dependent and the height of each step decreases with increasing diameter. In this way, the apodisation helps distribute energy in favour of near vision when reading in bright light, and in favour of distance vision when driving at night,” he said.

Good vision at all distances Dr Bellucci presented the six-month results achieved in 20 eyes of 10 cataract patients who underwent implantation with the new lens. The patients in the study ranged in age from 52 to 77 years and had a mean age of 67.4 years. The IOL power of the implanted lenses ranged from +17.5 D to +23.0 D and the target refraction was emmetropia in all eyes. In addition, all eyes had normal corneas with less than 1.0 D of regular corneal astigmatism.

At six months' follow-up, the patients' mean binocular uncorrected visual acuity was 0.15 logMAR at 4.0 metres and 0.14 logMAR at 40.0 centimetres. Their mean distance corrected visual acuity values were 0.0 logMAR at 4.0 metres and 0.07 logMAR at 40.0 centimetres. The results for intermediate vision were also very satisfactory, Dr

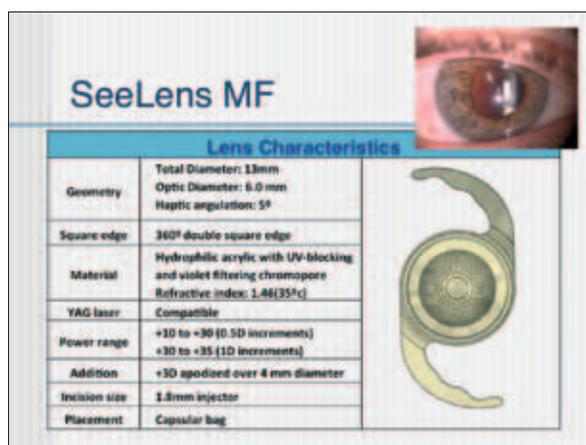


Figure 1: The Hanita SeeLens MF multifocal IOL

Bellucci said. For example, the mean uncorrected visual acuity was 0.18 at 1.0 metre and 0.16 at 0.63 metres. Similarly, the defocus curve showed that the lowest uncorrected visual acuity was always better than 0.2 logMAR (Figure 2).

“This is similar to what we are finding with most of the modern multifocal IOLs, the 0.4 logMAR at intermediate distances is a thing of the past,” he added.

Satisfactory optical quality Contrast sensitivity curves were quite good both in photopic and in mesopic conditions (Figure 3), and very similar to the curves usually obtained with good quality multifocal IOLs. This good clinical outcome is due to the high optical quality of this lens.

Optical quality in implanted eyes as determined by the optical quality assessment system (OQAS) were within normal range for monofocal hydrophilic IOLs. The mean optical scattering index was 2.5, which indicated poorer optical quality than is achieved with a monofocal IOL, which usually have a value below 1.0. Nonetheless, it compares favourably with the values generally achieved by some of the other diffractive multifocal IOLs.

Similarly, the width of the point spread function curve at 50 per cent of its height was 6.8 arc min, which while again indicating a poorer optical quality than is generally achieved with monofocal lenses – which usually have corresponding values below 5.0 arc min – was nonetheless quite acceptable for a diffractive multifocal IOL, Dr Bellucci said. The same was true of the mean modulation transfer function value, which was 94 (OQAS value) compared to values of around 130 (OQAS value) with monofocal lenses.

All patients reported having good vision without correction and said they no longer used spectacles for any activities. In fact, even patients with residual refractive errors of up to 1.0 D did not appear to perceive any visual deficit

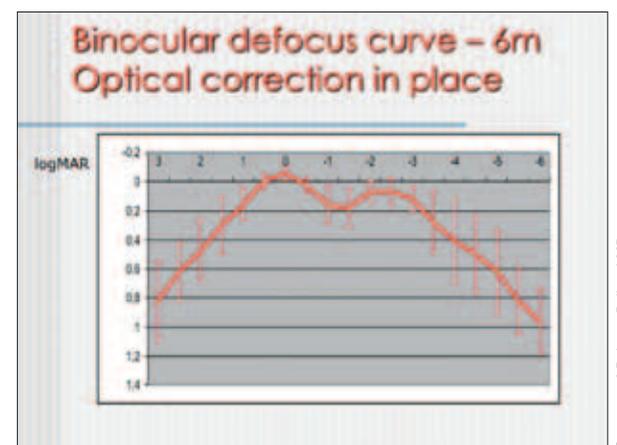


Figure 2: Binocular defocus curve in 10 patients implanted with the SeeLens MF multifocal IOL

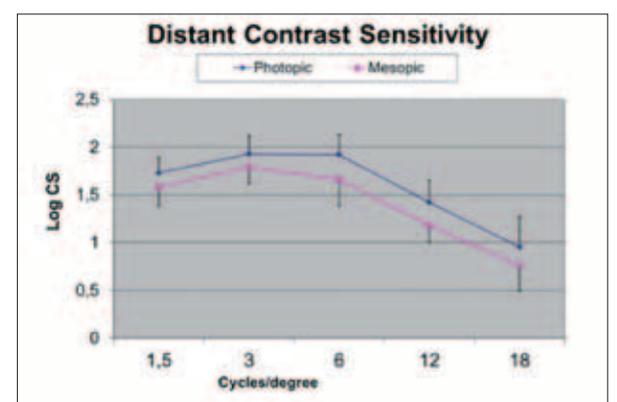


Figure 3: Photopic and mesopic contrast sensitivity in 10 patients implanted with the SeeLens MF multifocal IOL

without correction. Visual complaints included vitreous floaters in one patient and photic phenomena such as small haloes around lights in a few cases, Dr Bellucci said.

He noted that studies with longer follow-up will be necessary to determine the performance of the lens with regard to posterior capsule opacification. However, he pointed out that the lens has some design features that should minimise the incidence of the complication. For example, the optic has a sharp edge around its entire circumference and the five-degree angulation of the haptic presses the optic tightly against the posterior capsule preventing epithelial cell migration. In addition, the manufacturers of the lens do not polish the optic material, because polishing has a rounding effect on square edges. The lack of polishing also maintains optical properties of the diffractive steps, he noted.

“The new SeeLens MF multifocal IOL yielded good results in this preliminary six-month study. This IOL combines the advantages of the hydrophilic material with those of apodised diffractive multifocality,” Dr Bellucci said.



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