

# CATARACT & REFRACTIVE

## LIGHT ADJUSTABLE LENS

### Refractive results equal corneal laser surgery at 24 months; near vision improved

by Howard Larkin in Milan

At 24 months, patients implanted with the intraocular Light Adjustable Lens (Calhoun Vision, Pasadena, California, US) not only achieved vision outcomes equivalent to those seen with laser refractive surgery, they also showed significantly better near vision than patients implanted with conventional monofocal IOLs, Tobias H Neuhann MD, Munich, Germany, told the XXX Congress of the ESCRS.

Excellent results were obtained even in eyes with keratoconus, previous corneal refractive surgery or posterior pole or mature cataracts that rendered A-scan or IOL Master measurements unreliable.

“Difficult eyes showed the same good results as virgin eyes,” Dr Neuhann said.

He noted that both sphere and cylinder corrections after cataract surgery or clear lens exchange with the implanted LAL were similar to those seen in custom laser refractive surgery, and they remained stable and safe throughout the follow-up period. Good near vision in LAL patients was an unexpected positive side effect, which Dr Neuhann plans to investigate further.

**Fine-tuning after surgery** Dr Neuhann reported results from 65 eyes, including 41 “virgin” or uncomplicated eyes with no previous refractive surgery, and 24 complicated eyes. These included 13 post-LASIK eyes of which nine were myopic treatments and three hyperopic treatments with uncorrected visual acuity of 20/20-plus, and one myopic treatment plus a complete vitrectomy; two eyes with keratoconus with uncorrected visual acuity of 20/20 and 20/40; and nine eyes with no reliable IOL Master axis measurement, including two with mature cataracts and seven with posterior pole cataracts. Mean patient age was 63 years ranging from 48 to 83.

All eyes were implanted with the Calhoun LAL, an aspheric, three-piece silicone IOL with a 6.0mm optic. The lens is constructed of ultraviolet-sensitive silicone polymers that allow spherical and toric adjustment of about 2.0 D as well as correction of aberrations using the UV light delivery device. Once the desired refraction is achieved, the correction is locked in. This makes it possible to fine-tune postoperative refraction based on patients’ specific requirements making the LAL the perfect choice for patients who have had laser vision correction or corneal cross-linking, Dr Neuhann noted. In this series corrections were made two weeks after surgery.

Postoperatively, mean spherical equivalent fell to -0.37 D, ranging from -2.25 to 1.25 from a preoperative mean of 1.75 D ranging from -22.0 to 4.63. Mean sphere fell to -0.23 +/- 0.79 D from -1.41 +/- 4.51D preoperatively.

Mean cylinder also dropped to -0.28 +/- 0.37 D from -0.67 +/- 0.48 D after surgery. All eyes had low astigmatism, or 2.0 D or less preoperative said Dr Neuhann. He suggested that the LAL is especially good for treating low-dioptre astigmatism because they can be very difficult to measure precisely preoperatively.

“You can implant a -1.0 toric lens, but the reading you get preoperatively may be 1.0 but post-op it is 1.5. With the light adjustable lens, the patient tells you this astigmatism plus the axis and therefore the low-dioptre correction is so nice.”

Refractions were remeasured at three, six, 12, 18, 24 months, with some reaching 36 months as well. Mean spherical equivalent ranged between a low of -0.86 D at six months and a high of -0.25 D at 18 months, Dr Neuhann said. “This is a little fluctuation but we all have that. It depends on the dry eye and the history of refraction.”

At 24 months, 94 per cent of eyes were within ±0.5 D of the target refraction and all were within 1.0 D, Dr Neuhann said. Visual outcomes were also excellent, with all eyes achieving 20/30 or better uncorrected, 82 per cent 20/25 or better, 54 per cent 20/20 or better and nine per cent 20/16. These outcomes are similar to what he sees with custom corneal laser surgery, Dr Neuhann added.

**Near-vision bonus** An unexpected but welcome outcome was significantly better uncorrected near vision for LAL patients compared with conventional monofocal patients, Dr Neuhann noted. All 65 LAL-implanted eyes achieved J8 or better uncorrected compared with just 10 per cent of monofocal eyes. Nearly two-thirds of LAL eyes read J6 or better compared with two per cent of monofocal eyes, and one-third of LAL eyes read J4 compared with none for monofocal IOLs. Some 16 per cent of LAL eyes read J3. Other early users of the LAL have also observed the effect.

Dr Neuhann is uncertain why the LAL-implanted eyes did so well with uncorrected vision in what is still essentially a monofocal lens. “This is amazing and it was not intended. To this day we don’t know why.”

He noted, however, that after the second lock-in a significant amount of coma of about 1.2 microns can be measured, (see Figures 1a and b) producing post-op aberrations similar to those seen with Oculentis (Berlin, Germany) Mplus multifocal implants. The Mplus is an asymmetric bifocal design with an add on only one side of the lens instead of 360 degrees. “It is very close when you compare it to the Oculentis. Probably the induced coma and higher order aberrations make the patients read much better,” Dr Neuhann said (see Figures 1a and b).

Asked if the coma were induced between the time that the lens corrections were made and the time that they were locked in, Dr Neuhann responded that he did not know as

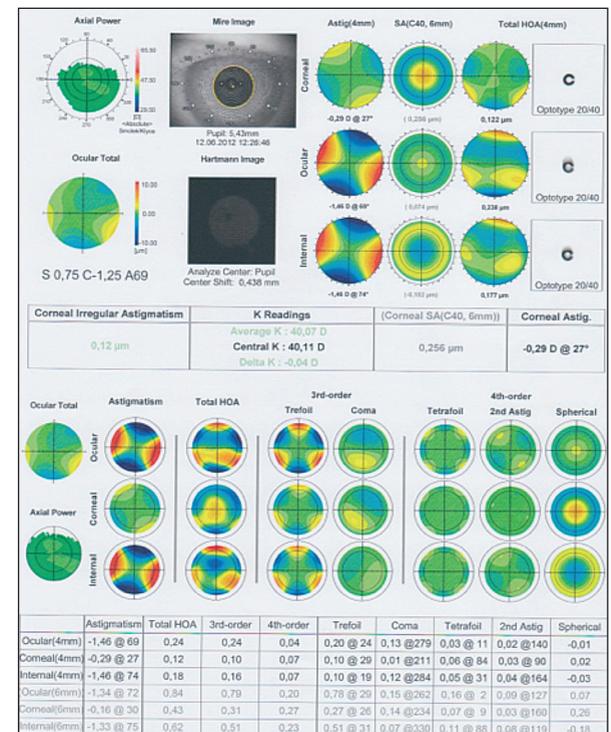


Figure 1a: 3rd and 4th order aberration preoperative – internal coma 0.12µm

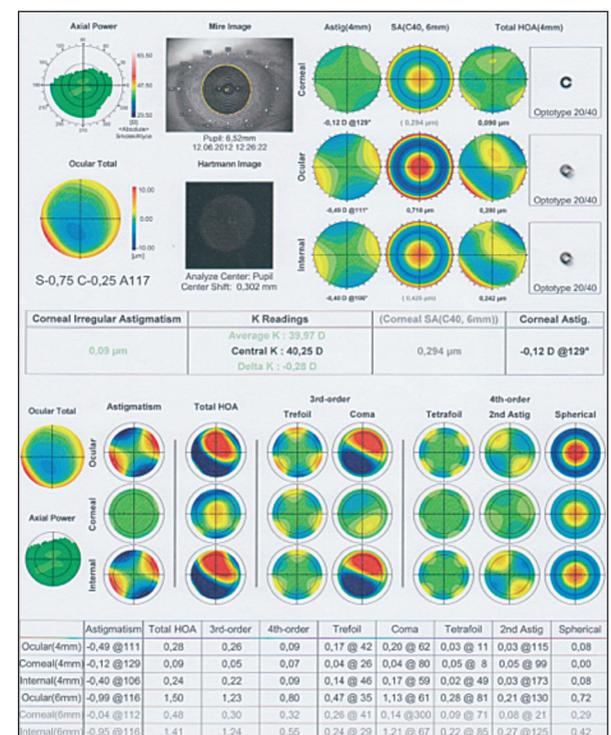


Figure 1b: 3rd and 4th order aberration postoperative – internal coma 1.13µm

the measurements were only made preoperatively and after the corrections were locked in.

“We don’t know what we induced or when we induced it. But since I can measure the internal wavefront aberrations and the corneal aberrations we shall see. Can we use this effect and enhance this effect? Time and scientific work will tell us.

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