LIGHT ADJUSTABLE LENS OUTCOMES

Novel technology allows excellent refractive outcomes in challenging cases

by Cheryl Guttman Krader in Vienna

The Light Adjustable Lens (LAL, Calhoun Vision) is safe and effective in the treatment of virgin and complicated eyes, providing desired refractive results that remain stable during follow-up to one year, reported Tobias H Neuhann MD, at the XXIX Congress of the ESCRS.

The study included 34 virgin eyes and 20 “complicated” eyes including 11 eyes with a history of myopic or hyperopic LASIK, two eyes with keratoconus and seven eyes with a mature or posterior pole cataract in which axial length could not be reliably measured. About 80 per cent of eyes underwent two adjustments prior to lock-in of IOL power. Thereafter, changes in spherical equivalence between serial visits were minimal and met the FDA criteria for refractive stability.

**Good outcomes** With data available from follow-up at 12 months for 39 eyes, including 12 complicated eyes, UCVA was 20/20 or better in all eyes and was 20/20 or better in the 11 post-LASIK eyes and five eyes with a posterior pole cataract. The achieved refraction was within 0.5 D of attempted in 95 per cent of eyes, and the outcomes were equally good in the virgin and complicated eyes, reported Dr Neuhann, medical director, Marienplatz Eye Clinic, Munich, Germany.

“Achieving accurate refractive outcomes after cataract surgery is challenging in eyes with a history of corneal refractive surgery, keratctasia, or when biometry measurements are otherwise unreliable. Using the LAL in these difficult eyes can provide refractive outcomes matching those achieved in virgin eyes because LAL power adjustments are made based on the patient’s postoperative refraction and do not depend on preoperative measurements,” he said.

“In our series, the refractive outcomes with the LAL for both sphere and cylinder power are remarkable. This technology is as safe as today’s customised corneal laser refractive surgery, and although the digital light delivery system used with the LAL is expensive (~€120,000), considering the excellent and reliable patient outcomes, in my opinion it is currently a much better investment than a femtosecond laser for cataract surgery.”

For the study eyes, preoperative mean SE (subjective refraction) was $-2.27 \pm 4.69$ D, sphere was $-1.95 \pm 4.69$ D, and mean cylinder was $-0.65 \pm 0.57$ D. Among the 39 eyes seen at one year, mean SE was $-0.51 \pm 0.59$ D, mean sphere was $-0.43 \pm 0.58$ D, and mean cylinder was $-0.17 \pm 0.23$ D.

Scattergrams for both sphere and cylinder outcomes showed that all eyes were within 1.0 D of attempted correction. R$^2$ for the regression line of attempted versus achieved refraction was 0.99 for spherical correction and 0.82 for astigmatism.

“Precise correction of astigmatism in the range of 0.5 to 2.0 D using a toric IOL is challenging in older patients because dry eye and small surface irregularities can make topography measurements unreliable. In fact, in ‘old’ corneas with less than 2.0 D of astigmatism, the results of two topographic measurements are rarely identical,” noted Dr Neuhann.

“Therefore, it was especially satisfying to be able to correct astigmatism so beautifully with the LAL in this series that included eyes with 1.5 to 2.0 D of astigmatism.”

The outcomes were also remarkable in the keratoconus patients. Dr Neuhann described one case involving a 49-year-old woman whose corneal thinning disease was not detected when she underwent cataract surgery with implantation of the LAL in her right eye. After surgery, she was +1.5 D off the attempted refraction and had irregular astigmatism. However, after LAL power adjustment based on her subjective refraction, she achieved 20/20 UCVA.

“The second eye of this patient has more advanced keratoconus and has also undergone cataract surgery with LAL implantation, but the final refraction has not yet been reached,” Dr Neuhann said.

Of the two eyes with a final refraction not within 0.5 D of intended, one eye had an SE of $-0.75$ D and the other was $-1.25$ D.

“The latter patient was not very compliant with postoperative instructions about wearing sunglasses, which is necessary to prevent changes to lens power from ambient ultraviolet light,” Dr Neuhann told EuroTimes.

Based on the outcomes with the LAL and its versatility, Dr Neuhann said he considers the LAL his “platinum” choice among premium IOLs. Per the manufacturer’s recommendations, spherical and toric power can each be modified by up to 2 D. However, clinical experience indicates the magnitude of possible power adjustment is even greater, and individual high order aberrations can also be corrected, he noted.

“The LAL has greater potential for customised correction beyond how it is being used today, but one application that I have found very helpful is for providing a monovision trial,” Dr Neuhann told EuroTimes.

More versatile For monovision, Dr Neuhann targets a refraction of plano in the dominant eye and -1.75 D in the non-dominant eye and allows a two-week trial to determine tolerability.

“Patients who choose pseudophakic monovision using a conventional monofocal IOL have no choice if they are unhappy but to adapt. With the LAL, there is a simple solution as I can easily ‘beam’ the myopic eye to emmetropia,” he said.

Dr Neuhann added that the LAL not only provides excellent unaided distance vision, but patients also achieve J4 to J6 unaided reading vision with an emmetropic refraction, which is much better than with a standard or aspheric monofocal IOL.

“As we will report, this benefit can be explained by depth of focus that is produced during the radiation process,” he said.

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