Cataract

Aspheric monofocal IOLs move towards a customised approach

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in Athens

PATIENTS who are not good candidates for multifocal IOLs may be better suited to one of the newer generation of aspheric monofocal IOLs, which can offer improved functional vision and better contrast sensitivity postoperatively, according to Manfred Tetz MD.

Dr Tetz, Eye Centre Spreebogen, Berlin, Germany, said that while most of the current focus is on improvements in multifocal technology, it was important not to forget those patients who are non-candidates for such lenses.

“I believe that these patients also have the right to get the best optical system into their eyes just like multifocal patients. I also consider that with the range of aspheric lenses now on the market, we can use this technology to deliver a customised approach in order to obtain the best possible outcomes for these patients,” he told a session of the ESCRS Winter Refractive Meeting.

Discussing the scientific rationale behind the current market trend towards aspheric monofocal IOLs, Dr Tetz explained that it stemmed from an attempt to counteract the impact of spherical aberration on the optical system of the ageing eye.

“The crystalline lens of young eyes has an overall negative spherical aberration that compensates for positive spherical aberration of the cornea. As individuals age, the crystalline lens loses the ability to compensate for corneal spherical aberration, and that is the reason why the industry is giving us lenses that are aspheric or intelligently aspheric,” he said.

Standard spherical IOLs, by contrast, add to the naturally occurring positive corneal spherical aberration of the eye. Spherical aberration is associated with glare, halos and a decrease of contrast sensitivity especially in scotopic conditions, he said.

Dr Tetz noted that there are currently three aspheric monofocal lenses on the market that have received FDA approval: the Tecnis Z9000 (AMO), the AcrySof IQ (Alcon) and the SofPort L61AO (Bausch & Lomb).

He said that the Tecnis was the first lens on the market to take the spherical aberration of the eye into account in its lens design. Wavefront analysis was used to confirm the average spherical aberration of the human cornea as 0.27 microns (Zernike 4) and this value was then incorporated into the modified prolate anterior surface design of the Tecnis IOL to compensate for the positive spherical aberration of the cornea.

The SofPort is a multi-piece lens made of third-generation silicone, with a refractive index of 1.43, and it introduces no spherical aberration to the eye, said Dr Tetz. The AcrySof IQ is a single-piece lens made of hydrophobic acrylic, and it has a refractive index of 1.55. It adds 0.20 µm of negative spherical aberration to the eye.

“Of all three lenses, Dr Tetz said that the Tecnis has been the most tested in clinical trials and has been shown to reduce overall spherical aberration essentially to zero compared to conventional IOLs.

In the FDA trials of the Tecnis lens, a subset of patients was randomly selected from all investigational sites to participate in testing in a validated night driving simulator, said Dr Tetz. Patients were tested in four night-time conditions: normal city, city with glare, normal rural and rural with glare. In each setting, patients were asked to detect and identify targets including white-on-green information highway signs, black-on-yellow warning signs and pedestrian hazards.

The Tecnis eyes performed functionally better than the control eyes in 21 of the 24 conditions tested and its performance led to a special FDA labelling for the lens.

Dr Tetz said that some surgeons opt to correct all patients using the average spherical aberration of the cornea, which is +0.27 µm.

“The idea is that counteracting this amount of spherical aberration will provide the vast majority of people with good functional vision,” he said.

However, Dr Tetz said that a more sophisticated approach might be to customise lens choice to each particular patient, as not all patients have an average spherical aberration of +0.27 µm.

“By measuring the patient’s pre-operative corneal spherical aberration, we can then determine what lens is best for each individual patient, rather than just patients as a whole,” Dr Tetz said.

Using this approach, Dr Tetz said that a patient with an atypical cornea with a lot of negative spherical aberration might derive most benefit from a standard non-aspheric IOL. A patient with the average spherical aberration of 0.27 µm could be fitted with a Tecnis lens, a cornea with very little spherical aberration in the range of 0.8 µm to 0.135 µm may do better with the SofPort IOL, and the AcrySof IQ lens could be considered for some patients who fall somewhere in between.

Dr Tetz said that aspheric IOLs ultimately give surgeons another viable treatment modality for patients who are ineligible for a multifocal implant.

“Aspheric IOLs can give better functional vision, so let us use them in a smart way and customise them for each individual patient who is not a candidate for a multifocal lens,” he said.

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