Presbyopia Solutions for a New Year

We have entered a New Year—2007—and what will it bring us in the arena of cataract and refractive surgery? One area of convergence is presbyopia, only because the effective commercial solutions are lens-based and of the variety that require a lensectomy.

The challenge of presbyopia daunts the surgical, optical, and optometric communities. Optical and technological improvements have resulted in less nauseating varifocals and disposable multifocal contact lenses. These modalities, while effective solutions, compromise visual quality.

So, what is a reliable and safe way to surgically correct presbyopia? Like much of medicine and surgery, there is no one way. It is safe to say that no matter what method is used, like those provided by our optometric colleagues, there is a compromise. As the majority of surgical options are not easily reversible, choice of method requires careful consideration.

Using the cornea as a substrate by ablative methods (eg, presby-LASIK) is investigative; promising outcomes are reported, however, it may not be the most forgiving and may compromise visual quality in dim illumination as well as affect contrast sensitivity. Use of corneal implants is also currently under investigation and showing great promise. One attraction of this technology is its reversibility.

A modality borrowed from optometrists is monovision (ie, blended vision). Unlike in the United States, it has a poor uptake and, in my own experience, has not been as accepted in the United Kingdom. Remaining options include multifocal and accommodative IOLs. Multifocals work, but also compromise vision and can cause night vision issues. With appropriate patient selection, however, multifocal IOLs provide a solution for a subgroup of patients.

While presbyopic solutions presently are a compromise, I do believe we shall have a solution in due course. This will resemble how we, as humans, manage until we are aged in our mid-40s, and that is through accommodation. Accommodative lenses using a single optical system that changes in either shape or position do theoretically provide better quality vision. Current options using a single optic have problems with reliability and effectiveness. Interestingly, hyperopes are felt to be the best candidates, although I am not convinced, as this argument only considers a single variable—lens power. Refractive surgeons who have taken care of hyperopes will agree, whether treated by refractive lensectomy or surface ablation, predictability of outcome is a problem, and often patients near emmetropia are still not happy. A change in just 0.25 D makes a considerable difference to the patient subjectively, often taking them from 6/9 to 6/5. Why is this the case? In those hyperopes with short axial lengths, the angle of a pencil of light rays focused on the retina is wider than myopes with longer axial lengths. For a small shift, there is thus a wider circle of blur accounting for a marked reduction in depth of field. Consider the high myopes who, following monofocal implantation, manage to read without spectacles. By design (ie, long axial length), they have a more forgiving optical system. So, how does this influence accommodating implants? Auditing our own results using the Crystalens (Eyeonics Inc., Aliso Viejo, California), we noticed better accommodative amplitude using near point of accommodation in patients who were myopic preoperatively and required low power IOLs!

One group of functional presbyopes that are sometimes forgotten are the existing pseudophakes. What options are available for this growing and fairly active group? Until recently, there were none, however, Acri.Tec AG (Henningsdorf, Germany) has clearly been listening to the views of the users and have now brought out the Acri.Vitalis, a diffractive multifocal lens designed to be piggybacked in the sulcus onto an existing IOL with sufficient vault. This modality is highly attractive, as it corrects minimal residual refractive spherical error as well as provides multifocality. As an emerging presbyope, I wait in anticipation for evolving technologies that will hopefully catch up with me at some stage. Until then, I cope with increasing illumination (much to my wife's annoyance) or—when no one is looking—a pair of half-moon 1.00 D readers!

Meanwhile, may I take this opportunity to warmly welcome our new Co-Chief Medical Editor, Khiun F. Tjia, MD. Khiun's expertise, as you have already gathered from his contributions, is in cataract surgery. We look forward to his valued input. ■

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