letters

Are 3 diopters of accommodation adequate for accommodating IOLs?

Rana and coauthors[1] present an insightful discussion of the theoretical considerations and potentials of different accommodating intraocular lens (IOL) designs. Work such as this allows us to look at the best designs for accommodating IOL technology and evaluate the benefits and limitations of these IOLs in an objective manner.

As an aside, we have noticed a tendency to equate 2.5 diopters (D) of accommodation with a 2.5 D bifocal add when discussing accommodating IOLs. We have slipped into the comforting belief that if we can design an IOL that delivers 2.5 to 3.0 D of accommodation, patients will be able to read at near and the ideal implant that will solve all our problems with regard to presbyopia will be at hand. An accommodating IOL differs from a bifocal add in that accommodative effort is required to change the effective power of the IOL. One item that many of us have overlooked in our quest for the ultimate accommodating IOL is the dogmatic advice learned years ago when we first started refracting patients for bifocals: To read comfortably at near, an individual needs to hold one third to one half his or her accommodation in reserve.[2]

Unfortunately, if this is true, the IOLs will have to deliver 5.0 to 6.0 D of accommodative amplitude to allow a patient to read comfortably at 33 to 40 cm while leaving half the accommodative reserve unused. An accommodating IOL that delivers 1.0 to 2.0 D of accommodative amplitude should allow a pseudophakic patient to read comfortably at 1 to 2 meters (0.5 to 1.0 D) but not at the near distances that are desired unless other pseudoaccommodative factors are taken into consideration. This may explain the postoperative patient who can see J3 print following accommodating IOL implantation and yet requires reading glasses for comfortable near work.

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References

1. Rana A, Miller D, Magnante P. Understanding the accommodating intraocular lens. J Cataract Refract Surg 2003; 29:2284–2287
2. Milder B, Rubin ML. The Fine Art of Prescribing Glasses Without Making a Spectacle of Yourself, 2nd ed. Gainesville, FL, Triad Publishing Co, 1991

Reply: The letter from Hoffman and coauthors raises 2 interesting issues: What test should be used to measure accommodative amplitude? With the results of the amplitude measurement, how is the proper add computed?

Fortunately, Vanderpol and Stark[1] have thoroughly investigated this issue. They describe a special test known as stigmatoscopy: Using Badal optics, a point light source is moved toward the patient and the distance of minimum blur is noted; ie, when the point of light looks smallest. In an actual measurement, focusing is accomplished by bracketing around the point of minimum blur. The virtue of this method is that it cancels the depth of focus factor, which is present in the pushup method, from the pure lenticular factor in the accommodative amplitude measurement.

How can stigmatoscopy answer the question posed by Hoffman and coauthors? Vanderpol and Stark note that in presbyopic patients, the results of the traditional pushup method are 1.75 to 2.00 D greater than the amplitude measured by stigmatoscopy. The difference is accounted for by the depth of focus factor primarily. Thus, old-time clinicians realized that the results of the pushup method did not correlate with a user-friendly add and empirically prescribed one half or one third the determined amplitude. They rationalized this approach by suggesting that keeping some of the accommodation in reserve would prevent asthenopia.[2]

The work of Vanderpol and Stark suggests to me that a reasonable range for an accommodating IOL should equal the power of the lenticular component of accommodation for reading, ie, 2.5 to 3.0 D.—*David Miller, MD*

References

1. Vanderpol C, Stark L. Preclinical presbyopic development. In: Obrecht G, Stark LW, eds, Presbyopia Research; from Molecular Biology to Visual Adaptation. New York, NY, Plenum Press, 1991; 263–272
2. Hofstetter HW. The accommodative range through the near correction. Am J Optom Arch Am Acad Optom 1948; 25:275–285