Commentary: Comparison of effects of cycloplegic drops (cyclopentolate 1% and tropicamide 0.5%) on anterior segment parameters

Accurate measurements of anterior segment parameters are essential for reducing the surprises following cataract surgery, phakic intraocular lenses (IOLs), and refractive surgery. Optical biometers provide accurate and precise anterior segment measurements and enable surgeons to obtain the most predictable IOL power.[1] It is important to know the effect of cycloplegic drop on measurements of anterior segment parameters. I congratulate the authors for evaluating the effect of cyclopentolate and tropicamide on anterior segment measurements obtained using Lenstar LS 900 (Haag-Streit AG, Bern, Switzerland) based on a low-coherence optical reflectometer (LCOR) technology.[2] The authors found that the effects of cyclopentolate and tropicamide drop on the anterior segment measurements were similar, and no significant changes in K1, K2, axial length (AL), white to white corneal diameter (WTW), and third-generation IOL power calculation were observed.[2] However, an increase in the Anterior chamber depth (ACD) values indicated that the anterior segment parameters before mydriatic agents should be used for fourth-generation IOL formulas and phakic IOL implantation.[2]

IOL Master, a Gold standard optical biometer measures the distance from the corneal vertex to the retinal pigment epithelium with an accuracy of ±0.02 mm or better. In a comparative study, IOL Master, Lenstar, and immersion biometry highly correlated for axial length ($R = 0.99$) in cataract patients.[3] Lenstar measures ACD from the back of the cornea which is important in a short anterior chamber and thicker corneas. The fourth-generation Haigis formula demonstrated low variability in prediction error across the range of AL (21–28 mm) and ACD (2.25–4.25 mm) analyzed, suggesting that the Haigis formula may be good for a wide range of eyes.[4] As increased ACD measurements following cyclopentolate and tropicamide have been observed in the present study, ACD measurements should be taken before instilling cycloplegics.

Although optical biometers are user-friendly and have a higher resolution (10–20 um), these devices fail to provide AL measurements in hard and dense posterior subcapsular cataracts. Nearly 20% of the cataract patients may need A-scan ultrasound biometry. Using biometry with advanced optical coherence tomography (OCT) is another option in these cases.

The pupil offset is an important anterior segment parameter in excimer laser and multifocal intraocular lens implantation. The change in pupil offset was not clinically significant.

In the future, innovative techniques including Corvis ST for evaluation of corneal biomechanical properties, Brillouin microscopy for corneal viscosity, and ultra-high-resolution optical Coherence Tomography (UHR-OCT) may provide a more detailed assessment of anterior segment structures with higher accuracy.[5] Artificial intelligence can integrate the findings from these new modalities and from conventional devices to generate protocols for the diagnosis/treatment of various anterior segment disorders.[5]

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