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Editorial

Refraction after the Implantation of New Generation Intraocular Lenses for Cataract Surgery

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The appearance of multifocal and accommodative intraocular lenses (IOLs) has supposed a revolution in the field of cataract surgery. Emmetropia and independence from spectacles is the main objective but clinicians have now to face with complex optical systems that incorporate multifocality based on different optical principles. For this reason, practitioners should have to reconsider if the clinical tools for refraction are still useful or the paradigm has to be changed. Defocus tolerance is lesser with multifocal than with monofocal IOLs. Likewise, classic refraction has shown several limitations after the implantation of multifocal IOLs, and errors on refraction may be the source of suboptimal outcomes if a secondary laser ablation has to be programmed.

The first issue to consider is the model of IOL we are dealing with. A comprehensive examination with the slit-lamp will allow us to figure out if the IOL is accommodative, refractive-designed (segmented or with circular sectors), or diffractive (with concentric rings). To evaluate visual acuity at different distances through IOLs, the use of the defocus curves demonstrates the presence of multifocality.

On the other hand, refraction is much easier in diffractive multifocal IOLs. Static retinoscopy is a reliable technique but is highly recommendable to use a halogen light source. Auto refraction is also reliable but it is important to remember a slight tendency to negative values in sphere and cylinder in this type of IOLs.

The possibility of error is much higher in annular refractive-based designs. Retinoscopy is reliable, but autorefractometry manifests a strong tendency to negative values. In zonal or segmented refractive-based designs, retinoscopy is only valid to verify the IOL centration. Regarding the cylinder, autorefractometry is not reliable, but the sphere may be accurately estimated if a correction factor of +1.25 D is applied. Also, the asymmetric design has shown to induce vertical coma with the double-pass technique.

Regarding subjective refraction, it is important to consider that classic tools as the bichromatic test and Jackson Cross Cylinders (JCC) have to be used with caution during refraction. It is not clear enough how multifocality affects longitudinal chromatic aberration (LCA) and bichromatic test is based on LCA. Likewise, it seems that the induced blurriness during JCC may be affected by multifocality, especially if the IOL is not well-centered. The adjustment of sphere is also controversial after the implantation of multifocal IOLs.

Also, certain pathological conditions may significantly mislead refraction measures. Posterior capsule opacification (PCO) may induce retinoscopic reflexes attenuation and astigmatism with no effect on a better visual acuity. In fact, PCO in multifocal IOLs induces a more dramatic reduction on visual acuity than monofocal IOLs. Also, dry eye may induce transient astigmatisms. Along the postoperative period is important to control the presence of cystic macular edema (CME) as a condition that may provoke a hyperopic shift and reduce VA.

In summary, Refraction is a complex procedure after the implantation of multifocal IOLs and clinical experience plays a major role in examining these patients. Optometrists and ophthalmologists should be aware of the characteristics and potential limitations of the different types of multifocal IOLs in order to employ the adequate techniques.

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