MALAYSIAN SOCIETY OF OPHTHALMOLOGY

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TECNIS® SYMFONY – EXTENDED RANGE OF VISION INTRAOCULAR LENSES

Cataract surgery has evolved from a simple procedure of removing the opacified crystalline lens to a method that additionally aims to correct all refractive errors. In the past years, the major goal of the implantation of intraocular lenses (IOLs) was the achievement of emmetropia for distance. Currently, IOLs are able to compensate not only for spherical errors, but also for astigmatism and presbyopia, providing a complete restoration of the visual function with high levels of spectacle independence. Multifocal intraocular lenses (MIOLs) are designed to reduce spectacle dependence improving certain aspects related to quality of life. To date, there is scientific evidence of the significant improvement of uncorrected near visual acuity (UNVA) after the implantation of MIOLs compared to monofocal IOLs, without a significant decrease of uncorrected distance visual acuity (UDVA). However, there are some concerns regarding the visual quality provided by MIOLs, such as glare, halos or reduced contrast sensitivity (CS).

Earlier MIOL designs were bifocal, allowing patient to obtain a postoperative functional distance and near visual acuity. Nowadays, the extended usage of computers and mobile devices has changed the preference of spectacle independence from near to intermediate distances. The latest generation of MIOLs based on diffractive platforms is able to distribute light in more than two different foci, the trifocal IOLs. These three focal points can be generated in two ways, either by combining two bifocal diffractive profiles in one surface of the IOL or by using a trifocal diffractive profile combined with a bifocal diffractive optic. Besides MIOLs, other new concepts have been developed on the basis of a diffractive optic pattern, such as the extended range of vision IOL Tecnis® Symfony.

The Tecnis® Symfony IOL is a new promising alternative to provide an extended effective and continuous range of high quality vision from far to near distances after cataract surgery or refractive lens exchange. This IOL is based on a new echelette optic design and combines the compensation for chromatic aberration and primary spherical aberration.

The average eye has approximately 2.00 D of chromatic aberration for wavelengths between 400 and 700 nm and 0.80 D for wavelengths between 500 and 640 nm. Because corneal chromatic aberration causes blur and reduction in contrast sensitivity, the correction of this aberration by means of an IOL based on achromatic optical technology should result in a sharper focus of light. The goals of extended range of vision and extended depth of focus IOL technologies is to provide patients with enhanced contrast sensitivity and to generate an extended

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range of vision or depth of focus, which reflect this need to compensate for corneal chromatic aberration.

The ability of a diffractive IOL with achromatic technology to compensate for corneal chromatic aberration, and, thus, to enhance contrast sensitivity, has been demonstrated in previous studies. Specifically, when correction of chromatic aberration is combined with correction of spherical aberration, the retinal image quality has been shown to improve without negatively affecting depth of focus. The ability of a diffractive IOL with achromatic technology to compensate for corneal chromatic aberration, and, thus, to enhance contrast sensitivity, has been demonstrated in previous studies. Specifically, when correction of chromatic aberration is combined with correction of spherical aberration, the retinal image quality has been shown to improve without negatively affecting depth of focus.

With its proprietary achromatic diffractive echelette design, the Tecnis® Symfony IOL (Abbott Medical Optics) is based on these optical principles. The achromatic diffractive pattern of this extended range of vision (ERV) IOL, which is available in both non-toric and toric versions, elongates the depth of focus of the eye and compensates for the chromatic aberration of the cornea. Therefore, this IOL does not show similar focus characteristics to either monofocal or multifocal IOLs. Clinical data do not demonstrate the typical behavior that results from designs using multiple focal points, as this ERV lens instead has an elongated focal area.

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