

Conflict of interests

No conflicting relationship exists for any author.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.optom.2016.10.002>.

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Analysis of the power profile of a new soft contact lens for myopia progression



Análisis del perfil de potencia de las nuevas lentes de contacto blandas para miopía progresiva

Myopia is the most prevalent refractive error and is currently considered as a public health problem because its prevalence is continuously increasing. Additionally, there is a relation between the progression of myopia and the associated risk of developing myopic maculopathy, retinal detachment and other ocular afflictions,¹ with this risk increasing for higher levels of myopia.

Soft bifocal contact lenses (CL) have been found to slow the progression of myopia in children.² It was suggested that such lenses reduce the rate of myopia progression in children because of the relative myopic defocus that they induce in the peripheral retina and/or because they reduce accommodative lags.³

Related to these effects, a new CL design has been launched into the market and is focussed on myopia control. The knowledge of the optical power profile of this

design could offer important information about the effective peripheral relative myopic defocus and the potential visual performance of the wearers.

Therefore, in this letter the power profile of this CL is analysed. At the same time, the power profile of a similar design of a bifocal CL for presbyopia correction is addressed. This analysis will be helpful for future extended studies that will address the effectiveness on myopia progression and/or the visual performance of the patients with these two designs.

Contact lenses analysed

The CL for myopia control was the MiSight® (Cooper Vision, Fairport, NY, US) and it had a nominal power of −3.0 D. The MiSight® is not only focused on myopia control as they also provide vision correction for the underlying ametropia. According to the manufacturers information, this lens present two zones devoted to far vision and two treatment zones (addition zones).

In order to show the differences with a multifocal design, a similar design was chosen for this work. This lens was the Acuvue® Oasys® for Presbyopia (Vistakon, Inc., Jacksonville, FL, USA) because it also has a multizone design with five alternating distance and addition zones.

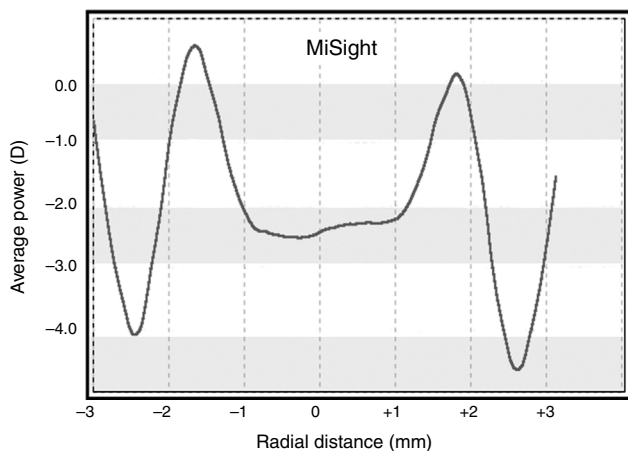


Figure 1 Power profile of the soft contact lens designed for myopia control: MiSight.

This lens is available in a variety of addition powers. It is expected that the higher addition power would create the higher optical power variations. Then, in order to show the minimum potential differences between both designs, the lens analysed in this work had “High” addition and it also had a nominal power of -3.0 D.

Instrument and measurements

The instrument used to generate the power profile of the lenses was the Visionix VC 2001 CL power analyser (Visionix Ltd, Jerusalem, Israel).⁴ The measurements were taken from the centre of the lens to a radial distance of 3.0 mm of aperture (total diameter of 6.0 mm). The Visionix VC 2001 CL uses the Hartmann–Shack principle for calculating the power profiles and it is considered an acceptable method for this purpose. However, it should be mentioned that other instruments, for example, those based on the Phase-Shifting Schlieren technique have shown higher resolution. This should be taken into account at the moment of addressing small amounts of diopters (D) in this work.

For this study, the ISO18369-3 recommendations were followed and Before each analysis, lenses were soaked in a saline solution at room temperature during one day. The lenses were inserted in the wet cell of the instrument. Three lenses of each model were measured and three measurements of each lens were made.

Power profiles analysis

The power profiles of the lenses for 6.0 mm of aperture are showed in Fig. 1 (myopia control) and 2 (bifocal). The horizontal bands in both figures indicate 1.0 D steps. These figures show how the myopia control CL presents a total of three concentric refractive annuli while the bifocal presents five.

The positive refractive annuli of these lenses are responsible for the creation of the myopic defocus. Observing the Fig. 1, it is possible to see that the myopia control CL presents a 2.0 mm central ring devoted to far vision. Beyond

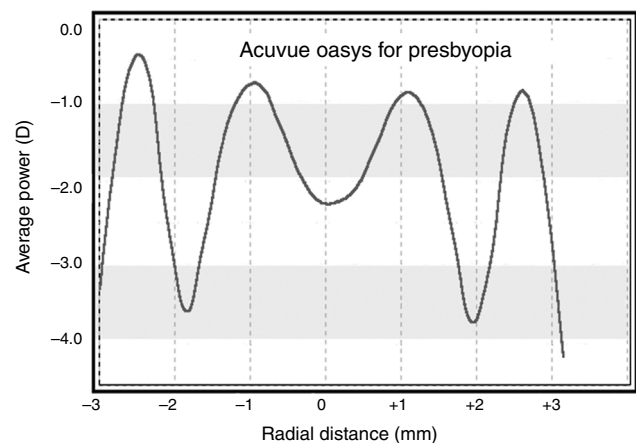


Figure 2 Power profile of the simultaneous vision multifocal soft contact lens: Acuvue Oasys for Presbyopia.

2.0 mm of diameter, there is only one complete positive annular ring at around 4.0 mm and other negative ring at around 5.0 mm. The fact of presenting only one positive ring suggests that for pupils under 4.0 mm, the amount of peripheral relative myopic defocus could be compromised. This should be taken into consideration because it has been reported that large pupil diameters facilitate the effect of slowing axial growth in myopia due to the enhancement of the myopic shift in the peripheral retina.⁵ It should be mentioned that the exposure of the ring will be positive in terms of myopic blur effect but will create a ghost retinal image. As the manufacturer suggests, this lens present other positive ring for apertures over 6.0 mm. It should be considered due to other positive ring may increase the ghost retinal image but it would also help in the creation of the myopic blur effect.

Conversely, the bifocal CL presents five narrower rings. The central one devoted to far vision is positioned within 1.0 mm from the centre. It means that even for smaller pupils some ring will be completely exposed and some myopic blur and positive addition should be created on the retina. This is interesting for creating myopic defocus, however, more refractive annular rings may induce more visual disturbances by the increase in the scattering into the eye.⁶

Despite their differences, both lenses should provide constant myopic defocus blur effect for children at both distance and near, since children do not use the near portion of the lens for near tasks, as presbyopic adults do. It is because the annular rings devoted to near vision do not provide near acuity as good as can be obtained through accommodation by young subjects.²

Even if a proper demonstration should be addressed in future studies, the higher changes in the power at the edge of these lenses may imply a higher peripheral relative myopic defocus. In relation to this and considering similar accommodative responses, these changes are showed to be higher for the myopia control CL: around 3.0 D for the inner and 4.5 D for the outer zone (Fig. 1) versus 1.5 D at the inner and 3.0 D at the intermediate and the outer zones of the bifocal (Fig. 2).

Both figures show that the centre of the lenses (devoted to far distance) does not reach the nominal distance power of the lens (-3.0 D), being slightly more positive. A higher nominal power of the lenses implies a higher addition, however, this may impact on distance vision. Therefore, this positive over-correction (around 0.5 D) should be taken into consideration by clinicians at the moment of prescribing the nominal power of these lenses.

Finally, it should be mentioned that a decentration of these annular designs could alter their optical performance.⁷ Hence, after the current analysis it is clear that the studies that will analyse the effectiveness of these lenses on myopia progression should properly control two parameters: the pupil dynamic of the patients and the centration of the lenses.

In summary, the myopia control CL seems to show some optical improvements for the use of these lenses in children. Nevertheless, future studies should analyse if these optical features are enough in terms of effective myopia control of the patients and the visual effects that this design could cause.

Conflict of interest

The author has no proprietary interest in any of the materials mentioned in this article.

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Cataract, strabismus and chorioretinal coloboma in paediatric HIV infection



Catarata, estrabismo y coloboma coriorretiniano en infección pediátrica por VIH

KEYWORDS

Cataract;
Strabismus;
Chorioretinal coloboma;
HIV

Background

With the availability of highly active antiretroviral therapy (HAART), the number of children surviving human immunodeficiency virus (HIV) infection is increasing. HIV-positive children exhibit numerous ocular manifestations and HAART in HIV-infected mothers during pregnancy may

increase the risk of birth defects including congenital ocular abnormalities.¹ Here, we present a paediatric case of HIV infection with bilateral posterior sub-capsular cataract, sensory strabismus and chorioretinal coloboma.

Case report

An eleven-year-old HIV-infected boy presented to a tertiary eye care facility in Nepal with the complaints of blurring of vision in both eyes. His CD₄⁺ T-cell count measured within a month of eye examination was 1087 cells mm⁻³ and he was under antiretroviral therapy since the age of four years. Detailed antenatal and perinatal history was not available except it was known that the mother was HIV positive and receiving HAART during pregnancy. On examination, presenting visual acuity (Bailey-Lovie log MAR chart) was 1.2 log MAR (4/60) in the right eye (RE) and 1.3 log MAR (3/60) in the left eye (LE). Cycloplegic refraction revealed refractive error of -2.50 DS/ -1.00 DC @ 90° in the RE and -1.75 DS/ -1.25 DC @ 90° in the LE, without any improvement on subjective refraction. Head posture was normal but bilateral esotropia was present while viewing at near and distance. The esotropia was $\sim 60^\circ$ to 75° with the Hirschberg test; poor vision