Corneal Topography in Assessing Multifocal CL Centration

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Introduction

Many people wearing multifocal contact lenses (MCCLs) for presbyopia correction may complain about a reduction in vision quality (Rajagopalan et al, 2006). Centration is one of the most relevant factors able to affect the efficacy of correction. Decentration of a MCCL with respect to the pupil centre will cause uncorrected astigmatism, mainly represented by coma (Oves, 2015). It has been previously suggested that corneal topography performed over a MCCL could be a useful method in evaluating lens centration (Lampa et al, 2012) and could help in clinical setting in understanding the results of the fitting and minimizing follow-ups (Miller and Bjoš, 2012). However, no information is available about the reliability of this method.

Purpose

To evaluate accuracy and reliability (inter and intra-observer) in MCCL centration assessment with topography performed over the CL.

Method

Silt Lamp Assessment of MCCL centre (SL)

A photo-editing digital procedure was used to assess the position (x and y coordinates) of the MCCL centre with respect to pupil centre, as taken from the SL photo. Starting with the original digital picture the edges of MCCLs were traced with an Image Editor Program (1). Then the centre of MCCL and the centre of the pupil were detected through the overlapping of a circular digital template aligned to the circumference of MCCL and pupil respectively (2). The two centres were connected with a digital line and its length in pixel was converted in mm to get the distance between the two centres (i.e. the position of the MCCL centre with respect to pupil centre).

Quantitative topographic assessment of MCCL centre (Tmax)

The position of the MCCL centre (x and y coordinates) was automatically detected as the point of maximum curvature from the videokeratography.

CLs (more positive value of y) respect to SL max = 1.60; p=0.20) but a significant difference was found among 4 coordinates. For the RE the one-way Anova didn’t show any difference among 4 procedures for x coordinate (one-way Anova Fmax=1.45; p=0.24) but a significant difference was found for y coordinate (one-way Anova Fmax=2.90; p=0.042).

Accuracy

For the RE almost all topographic methods estimate correctly a more temporally prone negative value of x and higher position of CLs (more positive value of y) respect to SL assessment (paired t-test; p=0.05). However the difference was clinically negligible (0.16±0.36 mm horizontally, 0.23±0.48 vertically). No statistical differences were found in the LE.

Intra-class correlation coefficient (ICC) was calculated. For each single operator among the 3 readings achieved in each manual procedure of CL assessment of centration with topography (Tmax, T0.2 and T0.3) ICC was obtained for each coordinate (x, y) and for each eye. ICCs were very good (between 0.70 and 0.86) in 5 operations and moderate (between 0.48 and 0.68) in the fourth.

Conclusion

The possibility to assess MCCL centration by performing a topography over the lens is an accurate method in the MCCL design and fitting. The possibility to assess MCL centration by performing a topography over the lens is an accurate method in the MCL design. Therefore, further research is required to evaluate the accuracy of other topographic software in the assessment of MCL centration.

References

Miller JR, Brujic M Minimize follow-up for multifocal contacts: do you hesitate to offer multifocal contact lenses to your patients? Contact Lens Practice; 2011: 37, 292-300.


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