Autorefractometer versus manifest refraction after implantation of bioanalogic polyfocal intraocular lens

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Polyfocal hyperbolic optics: refractive power is maximal in the center and continuously decreases without steps to periphery.

**Polyfocality = increased depth of focus**

<table>
<thead>
<tr>
<th>Hydrogel:</th>
<th>42% water</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refractive index:</td>
<td>1.43</td>
</tr>
</tbody>
</table>

Key WIOL-CF mode of action:
Extended depth of focus (EDOF) achieved by non-diffractive optics approach (i.e. minimizing diffractive optics limitations like low contrast sensitivity, high optical phenomena rate/severity, etc.) combined with pseudo-accommodation driven by pupil constriction.
Purpose

• Automated refraction (AR) is considered as fast and reliable method for evaluating refraction in the general population. After cataract surgery, AR usually gives a valid starting point that is followed by evaluating manifest refraction (MR), which is still the gold standard for determining any refractive error.

• However, the reliability of AR decreases in some circumstances, such as in eyes with polyfocal IOL, due to the hyperbolic posterior side of IOLs which causes deformation of the infrared beam used by these instruments.

• The current study was designed to compare the repeatability and accuracy of MR and AR in patients with polyfocal IOLs.
Methods

• Eyes that underwent uneventful cataract surgery followed by polyfocal IOL implantation were retrospectively evaluated in this study.

• Values from the autorefractometer (Nidek) were compared with the manifest refraction values to determine the correlation between these two methods.

• Spherical and cylindrical refractive errors were collected minimum one months after the surgery.

• 16 eyes of 8 patients were included in this study
• Mean age 60.4 ± 7.5 years (range 49-69)
Results

Statistically significant difference was observed in all measured parameters.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Manifest Refraction (D) ± SD</th>
<th>Autorefractometry (D) ± SD</th>
<th>Paired t-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sphere</td>
<td>16</td>
<td>-0.03 ± 0.195</td>
<td>+3.57 ± 1.649</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>Cylinder</td>
<td>16</td>
<td>0.00</td>
<td>-1.69 ± 0.930</td>
<td>P &lt; 0.0001</td>
</tr>
<tr>
<td>SE</td>
<td>16</td>
<td>-0.03 ± 0.195</td>
<td>+2.72 ± 1.290</td>
<td>P &lt; 0.0001</td>
</tr>
</tbody>
</table>

No significant correlation was detected.
Pearson correlation coefficient: -0.27 (P=0.331, 95% CI -0.69 to 0.28)
Conclusions

• The results show that postoperative values measured by autorefractometer cannot be used to estimate the manifest refraction in eyes with bioanalogic polyfocal IOL.

• Manifest refraction measurement remains the only method for determining the refractive status after cataract surgery with polyfocal IOLs.