Comparison of postoperative results after implantation of two preloaded hydrophilic acrylic intraocular lenses (IOLs)

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Purpose

- To evaluate and compare the predictability of intraocular lens power calculation of two preloaded hydrophilic acrylic IOLs with different haptic design.
Patients

- Prospective, randomised, case-series type study
- Cataract surgery using phacoemulsification technique on 507 eyes
- Exclusion criteria: any eye disease that can potentially restrict visual functions
- IOL diopter range: between +16.0D and +28.0D
Patients

• Group A: n= 65
  • 01-05.2016.
  • Hydrophilic acrylic material
  • Medicontur Z-Flex 690P
  • Data of 63 eyes analyzed
  • Mean follow-up time 151.0 days

• Group B: n= 462
  • Hydrophilic acrylic material
  • Medicontur Bi-Flex 677P
  • Data of 440 eyes analyzed
  • Mean follow-up time 123.6 days

http://www.medicontur.com
Pre/postop. examinations

- IOL calculation
  - Optical Low Coherence Reflectometry, multi formula
  - Lenstar LS900; Haag-Streit AG, Koeniz, Switzerland

- Corrected distance visual acuity (decimal)
- Manifest refraction, spherical equivalent (SE)
- At least 12 weeks postop.

- Difference between the manifest and predicted SE - "numerical error"
- Absolute value of difference - "absolute error"
- Average, median
Surgical technique

- 4 experienced surgeons
- Same surgical technique, equipment, materials
- No complications during surgery, in-the-bag implantation

<table>
<thead>
<tr>
<th>Surgeon</th>
<th>690P</th>
<th>Surgeon</th>
<th>677P</th>
</tr>
</thead>
<tbody>
<tr>
<td>NZ</td>
<td>34</td>
<td>NZ</td>
<td>166</td>
</tr>
<tr>
<td>DÁ</td>
<td>8</td>
<td>DÁ</td>
<td>85</td>
</tr>
<tr>
<td>FT</td>
<td>19</td>
<td>FT</td>
<td>186</td>
</tr>
<tr>
<td>KH</td>
<td>4</td>
<td>KH</td>
<td>25</td>
</tr>
<tr>
<td>All</td>
<td>65</td>
<td>All</td>
<td>462</td>
</tr>
</tbody>
</table>
**MEDJET PIL-MA**
3 clicks for easy, safe and predictable injection

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Product</th>
<th>Packaging</th>
<th>Incision size</th>
<th>IOLs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicontur</td>
<td>PIL-MA</td>
<td>Preloaded IOL in wet container</td>
<td>2.2 mm</td>
<td>Monofocal (Multifocal Toric Multifocal Toric) Bi-flex Z-flex Q-flex</td>
</tr>
</tbody>
</table>
### Age, IOL diopters

<table>
<thead>
<tr>
<th></th>
<th>Group A (690P)</th>
<th>Group B (677P)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>No.</td>
<td>63</td>
<td>440</td>
<td></td>
</tr>
<tr>
<td>Age (years)</td>
<td>73.26 ± 10.25</td>
<td>71.25 ± 10.20</td>
<td>0.317†</td>
</tr>
<tr>
<td>IOL diopters (D)</td>
<td>21.89 ± 2.09</td>
<td>21.83 ± 1.95</td>
<td>0.885‡</td>
</tr>
</tbody>
</table>

†: two-sample T-test; ‡: Mann-Whitney U test
Postoperative CDVA

- Z-Flex 690P: 0.92
- Bi-Flex 677P: 0.93
Postoperative absolute error (SE)

- Z-Flex 690P:
  - AE < 0.5D: 76.7%
  - AE < 0.75D: 93.0%
  - AE < 1.0D: 97.7%
  - AE < 1.5D: 100.0%

- Bi-Flex 677P:
  - AE < 0.5D: 82.3%
  - AE < 0.75D: 92.5%
  - AE < 1.0D: 97.0%
  - AE < 1.5D: 100.0%
Mean numerical error (ME)

*: Mann-Whitney U test
Mean absolute error (MAE) – 690P

<table>
<thead>
<tr>
<th></th>
<th>Median</th>
<th>Avg±SD</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE - Holladay 1</td>
<td>0.40</td>
<td>0.42±0.33</td>
<td></td>
</tr>
<tr>
<td>AE - SRK/T</td>
<td>0.38</td>
<td>0.41±0.36</td>
<td></td>
</tr>
<tr>
<td>AE - Hoffer Q</td>
<td>0.57</td>
<td>0.59±0.49</td>
<td>&lt;0.05*</td>
</tr>
<tr>
<td>AE - Haigis</td>
<td>0.38</td>
<td>0.39±0.35</td>
<td></td>
</tr>
</tbody>
</table>

*: Wilcoxon test, the expected absolute error of Haigis formula was significantly lower compared to Hoffer Q.
## Mean absolute error (MAE) – 677P

<table>
<thead>
<tr>
<th>Calculation Method</th>
<th>Median</th>
<th>Avg±SD</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AE - Holladay 1</td>
<td>0.27</td>
<td>0.36±0.32</td>
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<tr>
<td>AE - SRK/T</td>
<td>0.29</td>
<td>0.38±0.32</td>
<td></td>
</tr>
<tr>
<td>AE - Hoffer Q</td>
<td>0.31</td>
<td>0.38±0.30</td>
<td></td>
</tr>
<tr>
<td>AE - Haigis</td>
<td>0.31</td>
<td>0.37±0.31</td>
<td></td>
</tr>
</tbody>
</table>

*: Wilcoxon test, no significant difference was found between the calculation methods.
Conclusions

• Postoperative refraction can be planned with high accuracy in the case of implantation of both IOL types.
• The optic design of the two IOLs are similar, so the possible reason of the slight benefit detected in favor of the Bi-flex 677P can be explained with the difference of haptics.
• The higher mean error in Group A suggests, that the IOL constants of Z-flex 690P need to be corrected.
Thank you for your kind attention