Introduction

IOL power calculation

Precise IOL power calculation is essential for benefits of implant surgery.

- The regression formulae were developed to calculate the IOL power.
- These formulae are dependent on accurate measurements of the axial length and corneal curvature.

Measuring the biomeytry

- Corneal curvature
- The corneal curvature is typically measured by keratometry.

Axial length

- Contact ultrasound is the most commonly used technique for measuring axial length.
- Partial coherence interferometry has been introduced as an alternative technique to measure the axial length of the eye.

Purpose

- Determining the power of the intraocular lens to be implanted is a crucial factor in postoperative refractive status and visual acuity.

- There are several studies comparing the accuracy of refractive outcome measured by those two methods after cataract surgery.

- In this study, we performed IOL power calculation using the two methods above, and compared their refractive outcome in patients who presented for phacoemulsification surgery.

Method

- Retrospective study
- 74 eyes of 74 patients who underwent the phacoemulsification surgery.
- All cases were performed by one surgeon.

- Exclusion criteria
- Severe media opacity cases which interfere measuring the axial length in Partial coherence interferometry.
- Severe vitreous hemorrhage.
- Dense cataract.
- Diseases affecting axial length.
- Macula off retinal detachment
- Severe submacular hemorrhage. Silicone of tamponade cases.

- Measuring the biomeytry
- Preoperatively performed by partial coherence interferometry(IOL master®) and partial coherence interferometry(IOL master ®).
- The axial length and corneal curvature were measured.
- In Ultrascan®, the corneal curvature was measured by auto refractor-keratometer.

- IOL power calculation
- Calculated by SRIK-T formula which was built in each instrument. The Axial length and keratometric value in the SRIK-T formula was replaced by the value which was gained from the biomtery.

- Comparing the refractive outcome
- The difference between the predicted and postoperative refractive outcome for the two methodologies (Ultrascan® and IOL master®) were compared.
- The predicted refractive outcome means the estimated refractive error when we insert the selected IOL.
- The postoperative refractive outcome was gained by the manifest refraction after the surgery.

- Statistical Analysis
- PASW V8.0 for Windows (SPSS Inc., Chicago, Illinois, USA)
- Paired T test for comparing the refractive outcome between two groups.
- Linear regression analysis and Bland-Altman plot to identify the correlation between predictive and postoperative refractive outcome in the two groups.

Results

- Table 1. Patients demographics

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50 (61.33)</td>
<td>34 (36.67)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>52.11±11.0</td>
<td></td>
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</tbody>
</table>

- Table 2. Axial length and keratometry between two groups

<table>
<thead>
<tr>
<th>Ultrascan®</th>
<th>IOL master®</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Axial length (mm)</td>
<td>23.56±0.71</td>
<td>23.86±0.70</td>
</tr>
<tr>
<td>Keratometry(D)</td>
<td>46.93±2.15</td>
<td>46.93±2.13</td>
</tr>
</tbody>
</table>

- In the group of IOL master®, Axial length is longer (23.86±0.70) than the group of Ultrascan®.
- No significant difference in Keratometry between two groups.

- Table 3. Predictive and achieved refraction in all cases. (n=74)

<table>
<thead>
<tr>
<th>Ultrascan®</th>
<th>IOL master®</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predictive refraction outcome (in diopters)</td>
<td>0.03±0.19</td>
<td>0.03±0.19</td>
</tr>
<tr>
<td>Postoperative refraction (in diopters)</td>
<td>-0.93±1.27</td>
<td>-0.93±1.27</td>
</tr>
<tr>
<td>Mean absolute error (in diopters)</td>
<td>-0.47±0.89</td>
<td>0.08±0.74</td>
</tr>
</tbody>
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- Mean absolute error: The difference between the predicted and postoperative refractive outcome
- The difference between predictive and postoperative refraction was smaller in the group of IOL master® than Ultrascan®.

- Figure 1. Linear regression analysis of postoperative and predictive refraction

- Figure 2. Bland-Altman analysis of postoperative and predictive refraction

Conclusion

- The axial length measured in IOL master® was statistically longer than those measured in Ultrascan®.

- In keratometry, there was no significant difference between two groups.

- Generally, IOL master® is more accurate method for calculating the IOL power prior to the phacoemulsification surgery.

- But, in cases of vitreous hemorrhage, Ultrascan® seems to be superior to IOL master® in calculating the IOL power.

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