EFFECT OF CORNEAL THICKNESS, CURVATURE AND, AXIAL LENGTH ON GOLDMANN APPLANATION TONOMETRY

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Purpose: To examine the influence of corneal thickness, corneal curvature, and axial length on Goldmann tonometry.

Design: Prospective non-randomised (self-controlled) clinical trial

Participants: 125 eyes undergoing phacoemulsification

Interventions/testing: Pachymetry, Keratometry, Perkins (Goldmann) tonometry, and manometric IOP measurements before cataract surgery

Methods: 125 eyes of 125 patients (33 males and 92 females, mean age 72.91+/-13.2y, range 18 – 91y), with a corneal thickness of 568.8+/-.43.79 (462 – 705) µm, with a corneal curvature of 7.72+/-.0.27 (7.07 – 8.32) mm and an axial length of 23.62+/-.2.05 (18.84 – 32.93) mm. Before phacoemulsification the anterior chamber was cannulated at the temporal corneal limbus. IOP was manometrically adjusted to 20, 35 and 50 mmHg by water column. IOP was measured with a Perkins tonometer. Statistical analysis was performed with multiple regression analysis (SPSS).

Results: At all IOP levels the IOP readings were highly dependant on corneal thickness (p<0.0001), R²: 0.78 – 0.83. At the IOP level of 20 mmHg corneal curvature effected the IOP measurement (p<0.037) but not at levels of 35 and 50 mmHg (p>0.05). Axial length had no effect on applanation tonometry at all IOP levels (p>0.05). The dependence of the IOP reading on corneal thickness is shown in the “Dresdner correction table”.

<table>
<thead>
<tr>
<th>Corneal thickness (µm)</th>
<th>460-485</th>
<th>486-512</th>
<th>513-536</th>
<th>537-562</th>
<th>563-587</th>
<th>588-612</th>
<th>613-637</th>
<th>638-662</th>
<th>663-687</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correction factor (mmHg)</td>
<td>+3</td>
<td>+2</td>
<td>+1</td>
<td>0</td>
<td>-1</td>
<td>-2</td>
<td>-3</td>
<td>-4</td>
<td>-5</td>
</tr>
</tbody>
</table>

Conclusion: As corneal thickness effects Goldmann IOP readings we suggest that IOP readings be corrected by corneal thickness according to the “Dresdner correction table” to obtain the true IOP value.

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