Author(s)
Principal: Lutz E. Pillunat
Presenting: Lutz E. Pillunat, M.D.
Contributing: Stefan Rose, MD
Markus Kohlhaas, MD
Eberhard Spoerl, PhD
Andreas G. Boehm, MD

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Abstract Information

Abstract Title:
The effect of corneal thickness, axial length and corneal curvature on IOP measurements taken by applanation tonometry, tonopen and OBF

Purpose:
IOP measurement is an important parameter in the detection and monitoring of glaucoma. In a previous study it was shown that applantion tonometry is influenced by corneal thickness but not by corneal curvature and axial length. Aim of this study was to examine if there is an influence of the mentioned ocular parameters on tonopen and OBF tonometry in comparison to applanation tonometry.

Design:
Prospective clinical trial

Participants:
57 eyes of 57 patients undergonig phacoemulsification (19 m and 382 w, mean age 72.8+/-9.6y), with a corneal thickness of 549.3 +/-38.7 µm, with a corneal curvature of K1 =43,60±1,62D and K2=42,73±1,62D were examined.

Main Outcome Measures:
Dependence of IOP measurements by different tonometers from corneal thickness, axial length, and corneal curvature.

Methods:
Before phacoemulsification the anterior chamber was canulated at the temporal corneal limbus. In a closed system the IOP was adjusted to 20 mmHg by manometric watercolumn. IOP was measured with the Perkins tonometer, tonopen and the ocular blood flow system (OBF). Statistical analysis was performed with multiple regression analysis (SPSS).

Results:
At the IOP level of 20mmHg mean IOP readings were 20.72±2.08mmHg with applanation tonometry (p=0.11), 17.52±3.94mmHg with tonopen (p=0.001) and 15.82±2.67mmHg for OBF (p=0.001). Applantion tonometry readings were

positively correlated to corneal thickness (p=0.001), but not to corneal curvature (p=0.468), and axial length (p=0.344). Tonopen readings were not correlated to corneal thickness (p=0.450), corneal curvature (p=0.183) and axial length (p=0.379). OBF readings were correlated to corneal curvature (p=0.008), but not to corneal thickness (p=0.077), and axial length (p=0.170).

Conclusion:
At an IOP level of 20mmHg tonopen and OBF had a tendency to measure IOP false low whereas the applanation IOP measurements were most accurate. Applanation tonometry readings are affected by corneal thickness, and OBF readings by corneal curvature. Tonopen measurements are not influenced by corneal thickness, corneal curvature and axial length. Therefore, tonopen seems to be a good alternative for IOP measurements if corneal thickness or curvature needs to be considered.