



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) μ m, 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 ($p < 0.0001$), R^2 : 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”.

Corneal thickness (μ m)	460-485	486-512	513-536	537-562	563-587	588-612	613-637	638-662	663-687
Correction factor (mmHg)	+3	+2	+1	0	-1	-2	-3	-4	-5

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.