

Reproducibility and Clinical Evaluation of Rebound Tonometry

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PURPOSE To establish the reproducibility of a rebound tonometer in humans and the effect of corneal thickness on measurements, comparing it with Goldmann applanation tonometer.

METHODS In a first study designed to examine the reliability of the RBT, three experienced ophthalmologists undertook three consecutive intraocular pressure (IOP) measurements in 12 eyes of 12 normal subjects. A cross-sectional study was then performed to compare measurements obtained using the two tonometers in 147 eyes of 85 patients with ocular hypertension or glaucoma.

RESULTS Intraobserver coefficients of correlation obtained in the reproducibility study were 0.82, 0.73, and 0.87. Interobserver correlation was 0.82. There was a good correlation between IOP readings obtained by the RBT and the GAT ($r = 0.865$, $P < 0.0001$). RBT readings were consistently higher than GAT measurements (median difference, 1.8 ± 2.8 mm Hg). A Bland-Altman plot indicated the 95% limits of agreement between the two methods were -3.7 to 7.3 mm Hg (slope = -0.022 , $P = 0.618$). Using RBT, the point that best discriminated between patients with an IOP ≤ 21 mm Hg and those with >21 mm Hg, as determined by the GAT was >23 mm Hg (sensitivity, 70.5%; specificity, 95.1%). In terms of pachymetry, the two tonometers behaved in a similar way, with correlation observed between IOP measurements and central corneal thickness.

CONCLUSIONS Rebound tonometry is a reproducible method of determining IOP in humans. In general, it tends to overestimate IOP compared with Goldmann applanation tonometry. The tonometers used in both methods are similarly affected by pachymetry.