Glaucoma Research Society

DYNAMIC CONTOUR TONOMETRY: A NEW TOOL FOR THE MANAGEMENT OF THE GLAUCOMA PATIENT

Yves C.A. Robert[1], **Hartmut Kanngiesser**[2]
[1] Augenklinik, Triemlispital, Birmensdorferstrasse 497, CH 8063 Zurich
[2] R+D Department, SMT Swiss Microtechnology AG, Allmendstrasse 11, CH- 2562 Port

Background: Applanation tonometry often fails to properly distinguish POAG, OHT, and NTG, due to intrinsic errors associated with applanation tonometry. To address this problem, new methods for measuring IOP need to be sought.

Design: Prospective comparative instrument validation study

Materials / Participants: Autopsy eyes, normal volunteers, and glaucoma patients

Main Outcome Measures: Correlations between autopsy eye manometric IOP and new instrument measurements and comparisons between Goldmann and Dynamic contour tomometry and their relative dependence on central corneal thickness

Methods: We have developed a contoured tonometer tip which matches the shape of the cornea and contains a digital pressure sensor in its contact surface. The sensor measures IOP continuously when brought in contact with the cornea at a constant force. The device was validated using eye bank eyes which were hydrostatically kept at known IOPs. Various groups of patients and healthy controls were tested and their CCT and corneal curvature measured.

Results: In a 10-30mmHg range, the DCT instrument matches manometric measurements in eye bank eyes, with 0.4±0.2mmHg (mean±SD) constant offset. In contrast, Goldmann applanation tonometry (GAT) underestimates true IOP by –3.5±0.3mmHg.

A comparative study on healthy volunteers with a CCT ranging between 444 and 618µm (median: 550µm; IQR ±25µm) reports an average IOP of 16.3mmHg measured with DCT and 15.7mmHg with GAT. DCT measurements show no dependency on CCT, whereas GAT increases by 0.25mmHg per 10µm CCT increase.
In pre/post-LASIK studies, the DCT instrument yields similar IOP readings before and after surgery, whereas GAT readings exhibit an apparent 3mmHg IOP drop for an average –85µm CCT reduction.

Conclusion: Dynamic Contour Tonometry permits measuring “true IOP” without interference from CCT and other corneal factors. Since the device is capable of recording time-dependent fluctuations in IOP, it furnishes Ocular Pulse Amplitude (OPA) measurements in addition to “static” IOP, thus providing additional information potentially useful for discriminating between various disease groups.

Updated: March 11, 2008 12:57 PM AST