New tonometer provides IOP readings without influence of corneal thickness

The Pascal Dynamic Contour Tonometer is slit-lamp mounted and operated in a fashion similar to the Goldmann applation tonometer.

Elliot M. Kirstein, OD, FAAO

During its 50-year reign as the “gold standard” in intraocular pressure measurement, few clinicians concerned themselves with the limitations of Goldmann applation tonometry (GAT). When GAT was introduced in the 1950s, Hans Goldmann clearly disclosed the limitations of his own instrument, telling us that its accuracy was optimal with corneal thickness of 520 µm and that it progressively lost accuracy as thickness varied from that point.

The Goldmann tonometer’s shortcomings were more clearly revealed in the recent Ocular Hypertensive Treatment Study (OHTS) and discussed in numerous other recent publications.

In response to the new concerns raised by OHTS, optometrists and ophthalmologists have done a commendable job of adding pachymetry to their glaucoma workup. This action serves as testimony to their determination to seek accurate measurement of IOP. In spite of this effort, some consider the nomograms for compensating for corneal thickness and rigidity inaccurate and unreliable.

To address the shortcomings of GAT, the Pascal Dynamic Contour Tonometer (DCT) was developed by SMT Swiss Microtechnology AG, a member of the Switzerland-based Ziemer Ophthalmic Systems Group. The Pascal, which recently received approval from the Food and Drug Administration for U.S. distribution, was given its name in honor of Blaise Pascal, a 17th century mathematician and physicist who is known for the “Pascal Law of Pressure.”
Contour surface

The influence of corneal thickness and rigidity on IOP estimates obtained with conventional applanation tonometers is eliminated by employing a built-in “SensorTip” with a solid-state “Pressure Sensor,” which matches corneal curvature. The contour surface has been calculated to generate minimum distortion of the cornea and to direct all forces acting within the cornea to the pressure sensor surface.

The Pascal is slit-lamp mounted and operated in a fashion similar to GAT. Gathering 100 IOP values per second, it records the dynamics of IOP rather than a pseudo-static figure and hence furnishes information on the entire range of short-term pressure fluctuations to which the eye is subjected. In response to our increasing concern about contamination and infection hazards with contact tonometers, the Pascal employs disposable tip covers. Additionally, the Pascal reports the ocular pulse amplitude (OPA).

Ocular pulse amplitude

While researchers have linked decreased OPA with normotensive glaucoma, an instrument that accurately measures this value can provide more revealing investigations on the nature and validity of the hemodynamic component of the pathogenesis of glaucoma. The digital panel on the Pascal tonometer displays the average minimum IOP and the OPA.

Studies have shown DCT measurements to closely compare to manometric values in cadaver eyes and to reveal no significant change when comparing IOP pre- and post-LASIK.

For Your Information:

- Elliot M. Kirstein, OD, FAAO, is the director of a four-doctor, two-location private group practice in Cincinnati. He can be reached at 11304 Montgomery Rd., Cincinnati, OH 45240; (513) 530-0440; fax: (513) 530-0473; e-mail: drkirstein@drkirstein.com. Dr. Kirstein is a consultant for Ziemer Ophthalmic Systems AG – SMT Swiss Microtechnology AG, Switzerland.
References: