Letter to Editor

A comparison between rebound and Goldmann's tonometers in screening of patients for glaucoma

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Dear Editor,

Goldmann applanation tonometer (GAT) has been the gold standard for intraocular pressure (IOP) measurement for over five decades. However, the last few years have seen lots of research in an effort to develop the ultimate tonometer. One of the outcomes of that effort is the rebound tonometer (RBT) (Icare; Tiolat Oy, Helsinki, Finland), which has appeared in clinical practice after extensive research in animal models. It's relatively low cost; portability, ease of use and no need for anaesthesia make it ideal for routine clinical practice.

We carried out a study to assess the advantages of rebound tonometer over Goldmann applanation tonometer in screening of patients for glaucoma and to compare intraocular pressure values obtained with RBT and GAT in subjects with normal and altered corneas.

A total of 150 patients (120 with normal corneas and 30 with altered corneas due to scarring) aged between 5-70 years, attending the out patient department of Regional Institute of Ophthalmology, Sitapur, India were included in this cross-sectional study. Informed consent was obtained from each patient. The IOP was determined first with the RBT and then with the GAT after a 5 minute-interval by two experienced ophthalmologists. A mean of three measurements were done by both the RBT and GAT. The first ophthalmologist who took the RBT readings was blind to the readings of the GAT taken by the second ophthalmologist and vice versa. Statistical analysis of data was done by the SPSS 12.0 software.

The study was performed on 150 eyes of 150 patients (120 with normal corneas and 30 with scarred corneas). The patient's age group varied from 5 - 70 years with a mean age of 52.7 ± 15.6 years. 60 % of the patients were male (90 male and 60 female). In the 120 patients with normal corneas, the mean IOP readings with RBT were 17.5 ± 4.5 mm Hg and with GAT were 16.5 ± 3.4 mm Hg ($P < 0.001$). Thus, the readings with RBT were 1 - 2 mm Hg higher than reading obtained with GAT. The mean difference was < 2 mmHg in 80 % of the cases (96 out of 120 patients). In scarred corneas, the mean difference was < 2 mmHg in 70 % of the cases (21 out of 30 patients). Out of the 30 patients with scarred corneas, IOP could not be measured in 9 patients with GAT and in only 1 patient with RBT. Excellent correlation was shown between RBT and GAT ($r = 0.854$; $P < 0.001$). No complications arising from the use of either tonometer were recorded.

Rebound tonometry is useful for obtaining repeatable and reliable readings. However, portability, ease of use and good results are what make the RBT different from other commercial tonometers currently in use on the small corneal area, used to measure IOP. Portability and no need for either any anaesthesia or the

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slit lamp make it suitable for use in patients with disability and for screening at home, as well as saving space and time in the consulting room. Another advantage of the RBT is the numerical display of result, decreasing chances of reading errors or bias. Also there are very little chances of infection as a disposable sterile probe is used. This is in contradiction to GAT with which keratitis may occur (although rare) even after all aseptic precautions. The additional benefit of RBT is the possibility of taking measurements at different corneal locations easily, using only a small part of the cornea.

The IOP readings obtained with RBT show excellent correlation with GAT. In our study, the IOP readings obtained with the two tonometers correlated well($r=0.854$; $P<0.001$).This is in agreement with other previously performed studies. Rehnman & Martin (2008) have reported that the mean difference between the IOP obtained with RBT and GAT was small (1.5±3mmHg). Munkwitz et al (2008) made comparisons between RBT and GAT over a wide range of intraocular pressures. They found that in 63% of the patients, the difference was less than 3 mmHg. They concluded that RBT is a good alternative to GAT in the low to moderate IOP range. Iliev et al (2006) found that 84.1% of RBT readings were within 3 mmHg of GAT. They observed that RBT is a reliable alternative for screening and in cases where positioning of the head at the slit lamp is impossible, or where topical preparations are to be avoided.

An additional advantage of RBT is its use in measuring IOP in scarred corneas. In our study IOP could not be measured with RBT in only 1 out of 30 patients with scarred corneas. Montanes et al (2007) have also observed that RBT could be useful in routine clinical settings when measuring IOP in corneas with pathologies.

The rebound tonometer measures IOP in unanaesthetized patients in a very brief period of time. It is easy to use and is convenient for measuring IOP in all age groups. It has excellent correlation with Goldmann applanation tonometer. Since the area of contact of probe is less than 1 mm, it is also useful in most cases with altered corneas.

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