The discrepancy of non-contact tonometer and Goldmann applanation tonometer in the fluid accumulation of corneal epithelium or stroma

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Purpose: To report two cases of glaucoma patients with a history of fluid collection under the LASIK flap or in the epithelial bullae showing wide discrepancy in intraocular pressure (IOP) between Goldmann applanation tonometry (GAT) and non-contact tonometry (NCT).

Cases: A 20-year-old male glaucoma patient complained of blurred vision in his right eye. He had a history of uneventful bilateral LASIK 1 year ago. On our initial examination, his best-corrected visual acuity was 20/400 in the right eye and his IOP in the right eye was measured to be 14 mmHg by GAT (Goldmann AT 900/870, Haag-Streit, Switzerland) and 40 mmHg by NCT (TX-F, Canon, Japan). The slit lamp examination showed corneal epithelial edema with diffuse interface opacities (Figure 1A). The ultrasound biomicroscopy (UBM, Dicon P45 UBM plus, Paradigm, USA) demonstrated interface fluid accumulation between the LASIK flap and the stromal bed (Figure 1B). The patient was scheduled for trabeculectomy. Seven days after trabeculectomy, his right vision improved to 20/30 and his IOP was measured to be 12 mmHg and 14 mmHg by GAT and NCT respectively. Corneal epithelial edema, interface opacities and fluids resolved after trabeculectomy. A 48-year-old male presented with complains of blurred vision in his right eye. Three years earlier, he had undergone laser iridoplasty and iridotomy for an angle closure glaucoma. His IOP range was 13-15 mmHg for 3 years by anti-glaucoma medication to control IOP. On examination of right eye, his best-corrected visual acuity was 20/40, the IOP was 2 mmHg by GAT, and 13 mmHg by NCT. The slit lamp examination and UBM showed epithelial bullae which is fluid accumulation between corneal epithelium and stroma in the right eye (Figure 2A, 2B).

Conclusions: The IOP measured by GAT underestimates the true pressure due to the fluid accumulation in the cornea. In such case, NCT may be a convenient and a reliable method in determining the true IOP.