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# Evaluation of modern transpalpebral transscleral tonometry before and after keratorefractive surgery

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## Abstract

**Purpose** : Measurement of intraocular pressure (IOP) is needed for the screening, diagnosis and monitoring of glaucoma. In ocular surgery IOP-values are used for the indication of the operation and for its monitoring. Corneal tonometry has limitations when using after keratorefractive surgery. Modern transpalpebral scleral tonometry is not directly influenced by corneal surgery and it has been shown to provide reliable IOP-measurement results. We evaluate the clinical use and the reliability of modern transpalpebral transscleral tonometry in patients with refraction anomaly before and after keratophotorefractive surgery.

**Methods** : 97 individuals (age: 18 - 53 years) with ametropia of different grades were included in the retrospective study. 59 subjects (age: 19 – 53 years) from the cohort had no history of keratophotorefractive interventions. Other 38 subjects (age: 18 – 50) underwent excimer laser correction of vision with different durations of post-surgery period from 7 days to 4 years. IOP was assessed with transpalpebral tonometry (Diaton transpalpebral scleral tonometer, Tonom GmbH) and Goldmann Applanation Tonometry (GAT) in both eyes of each patient.

**Results** : Individuals unaffected by the surgery showed GAT IOP of 18.0 (15.0 - 19.0) mmHg [median($1^{st}$ quartile - $3^{rd}$ quartile)], CCT corrected GAT IOP of 17.2 (14.9 - 18.4) mmHg and transpalpebral IOP (tpIOP) of 14.5 (12.5 - 16.0) mmHg. In patients after keratophotorefractive correction GAT IOP amounted to 11.8 (10.0 - 14.0) mmHg, CCT corrected GAT IOP was 14.3 (12.8 - 16.3) mmHg and tpIOP was 15.0 (13.4 - 17.5) mmHg.

GAT IOP showed strong correlation with CCT: r = 0.606; p<0.001, while CCT corrected GAT IOP (r = 0.095; p = 0.355) and tpIOP (r = -0.125; p = 0.224) did not correlate with CCT. Bland-Altman plots show a good agreement between CCT corrected GAT and tpIOP.

**Conclusions** : Transpalpebral transscleral tonometry results were independent from biomechanical properties of the cornea, while GAT showed dependence of IOP-measurement on these properties. CCT corrected GAT IOP values before and after corneal surgery differ from each other, while Diaton tonometry values remain stable. In the whole group CCT corrected GAT and transpalpebral IOP-values were in a good agreement. This study confirms the reliability and advantages of the clinical application of transpalpebral transscleral tonometry after photorefractive surgery.

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