Purpose:
The purpose of the study is to evaluate the clinical use of transpalpebral scleral tonometry, reliability of its application in the patients with refraction anomaly in pre- and postoperational period, dynamics of eye morphometric rates (pachymetry of the central corneal zone, IOP) and their correlative bond before and after photorefractive surgeries.

Patients and Methods

We have analyzed the results of prospective comparative case series clinical study in 98 patients (194 eyes) with ametropia of various degrees, among which 59 persons (118 eyes) form the group of patients, who have no keratophotorefractive surgeries in past history, and 39 patients (76 eyes), which were the subject to excimerlaser vision correction

The following factors were exclusion criteria from the study:
• Cornea pathology, influencing prognostically the applanation tonometry results;
• Upper eyelid and sclera pathology, which are the contraindications for transpalpebral diaton-tonometry

Before and after the surgery all patients were subject to the complete refractive examination, including keratotopography and wavefront-aberrometry. In a number of patients for cornea state morphologic evaluation we conducted
• US-biomicroscopy of the corneal optical zone before and in two months after laser correction
• Pachymetry corneal thickness in central (4 points) zone - central corneal thickness (CCT) in each patient
• IOP was measured with Goldmann applanation tonometer, pneumotonometer and transpalpebral scleral diaton tonometer using traditional methodology, all ophthalmotone measurements were realized the patients being in the sitting position with time interval being 2-3 minutes between two investigators.
Results and discussion

While analyzing morphometric parameters in the group of patients which were not the subject to photorefractive surgeries the mean PCT value was 554.5±32.4 μm, and the mean value of applanational IOP – 16.1±2.6 mm Hg, mean ophthalmotone level evaluated with diaton tonometer - 14.7±2.5 mmHg. At that correlation between values of the applanation tonometer and transpalpebral scleral diaton tonometer was highly reliable (r = 0.73, p±0.005). To define the advantages of scleral tonometry in comparison with the traditional keratoapplanational method we made calculations of real ophthalmotone in the patients of this group taking into account pachymetry, ophthalmometry and applanation tonometry data. Mean value of the real IOP after applanation value converting was 15.4±2.4 mmHg. Pearson correlation coefficient between real IOP (modified result, received with applanation tonometry) and the value, determined with diaton tonometer was 0.89, p<0.005, which shows high reliability of transpalpebral scleral tonometry.

In the groups of patients, underwent photorefractive vision correction, mean PCT was 499.8±50.9 μm, mean applanation value of IOP – 12.4±2.91 mmHg, modified taking into account keratometry IOP rates – 13.9±3.0 mm Hg, mean diaton-tonometry result - 15.1±2.75 mm Hg. At that we notice approximation of diaton-tonometry figures to the modified applanation IOP value taking into consideration keratometric rates - increase of correlation coefficient from 0.51 to 0.81.

Correlation analysis of PCT and IOP results in the group of patients, examined both in preoperative period and after photorefractive vision correction showed reliability of this correlation, p<0.005, reduction of IOP for 1 mm Hg is registered PCT being decreased for 29.7 μm. At that difference between pre- and postoperative IOP during applanation tonometry was 3.5 mm Hg, and during diaton-tonometry - 1.8 mm Hg, that is statistically dissimilar (t>2, p<0.005), which shows significant advantage of ophthalmotone evaluation if we omit cornea.

Conclusion

Thus, cornea thickness is the important factor of IOP evaluation and monitoring and requires the necessity of including corneal pachymetry in the program of examination the patients with suspicion of glaucoma and hypertension, especially after various keratorefractive surgeries while using the traditional corneal methods of ophthalmotonometry. At the same time clinical application of transpalpebral scleral diaton tonometer makes it possible to evaluate IOP using only one device, the procedure being efficient, economical, simple in performance and requiring no additional instrumental examination.