



Calculating of Optical Power of a Toric IOL at the Pathological Cornea

Authors have no financial interests

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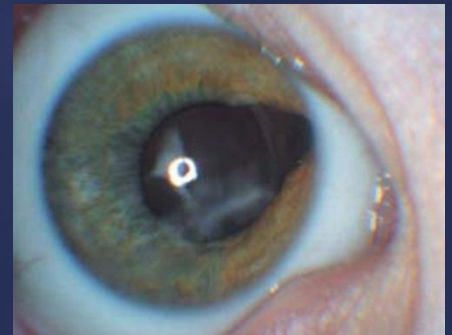
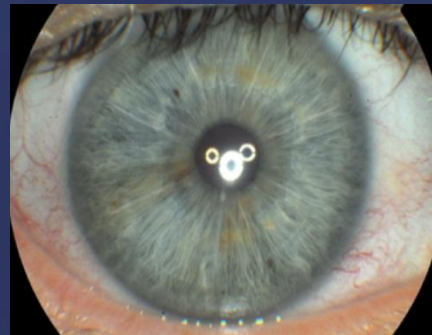
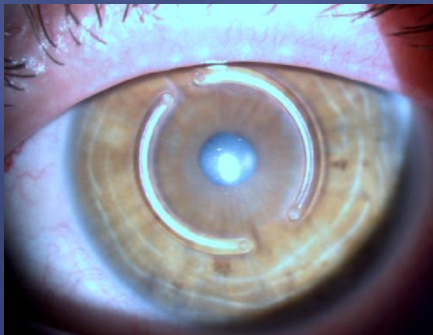
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Purpose

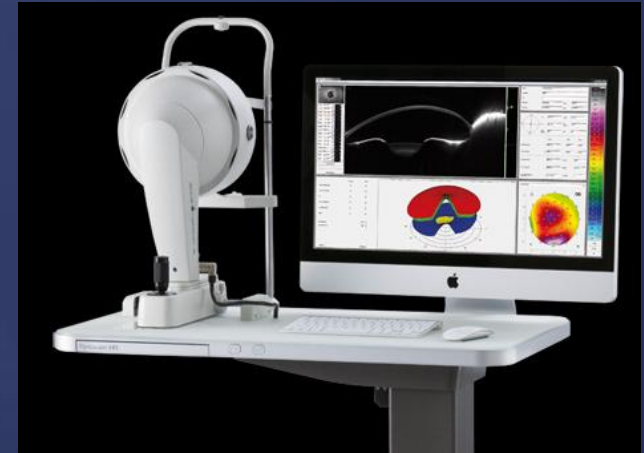
To assess the effectiveness of the method of calculating the optical power of the toric IOL at the changed cornea.

Methods

Toric IOL was implanted in 63 patients aged from 15 to 72 who have different initial corneal changes – keratoconus of I-II degrees (14 patients), corneal scarring after keratoplasty, keratotomy (24 patients) and posttraumatic scars (25 patients).



Methods



Refractive corneal properties were investigated on the complex topographical scanner Pentacam. For calculating the IOL power we assessed a frontal corneal scan in the central area with a diameter of 3.0 and 5.0 mm, irregular astigmatism along the main meridians and the profile of the optical power of the cornea. The optical characteristics were put into the On-line calculator.

In the postoperative period a deviation of a subjective refraction from a target refraction and stability of optical result were estimated. Duration of follow-up was 1 year.



Results

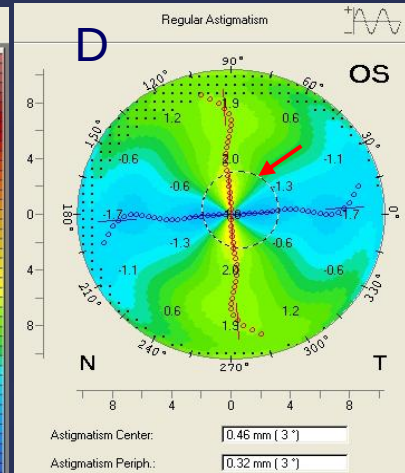
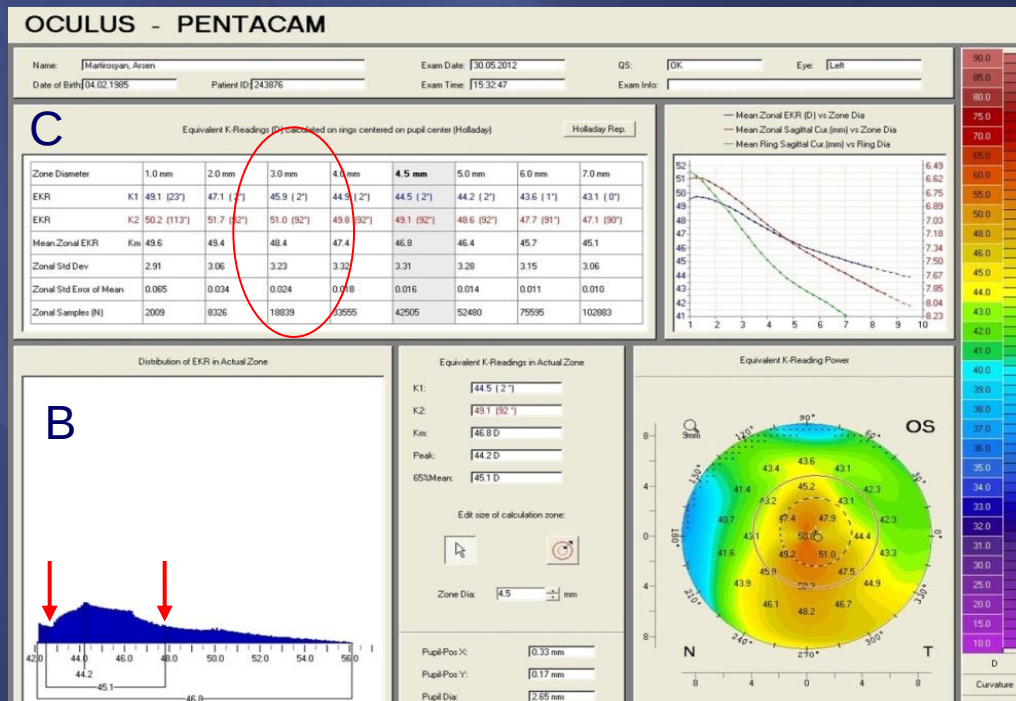
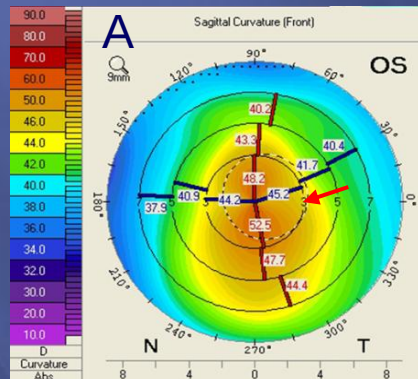
With using Pentacam data, obtained in the zone with 3.0 mm diameter, the frequency of refractive errors within $0, 75 \text{ D} \pm 0, 25 \text{ D}$ was 19.6%, more than $1.5 \text{ D} \pm 0, 25 \text{ D}$ was 8.9%. With the extension of the research zone up to 5,0 mm the frequency of errors in calculation IOL increased by 1.75 times.

If the difference of refraction between strong and weak meridians of cornea was more than 6.0 D, and in the presence of insignificant irregular astigmatism in central zone, the refractive effect was less predictable.



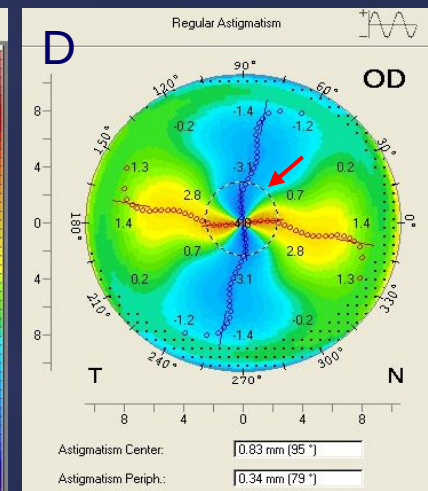
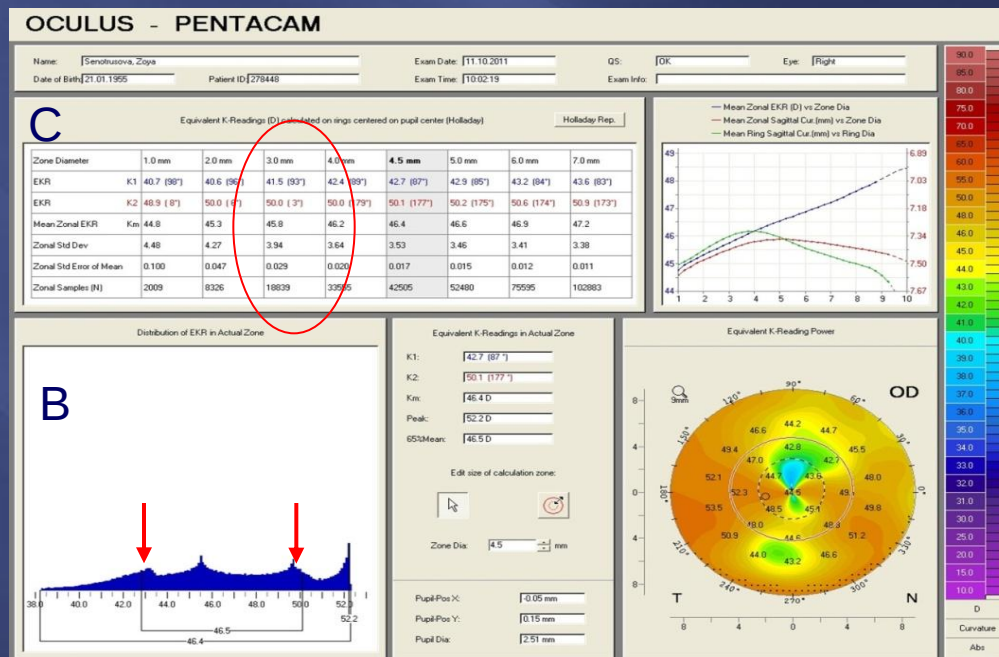
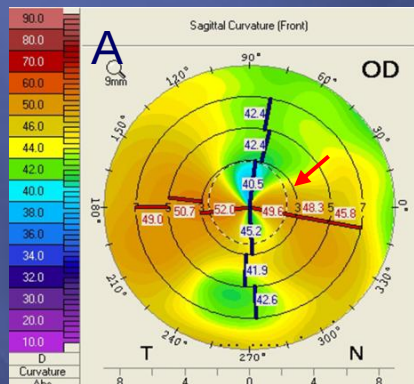
Case 1

The patient S., 25 years old, had keratoconus of III degree, visual acuity 0,05 with correction Sph -3,5D Cyl -2,75D 0,15, biometry - 24,33 mm. In actual 3 mm zone the cornea had the different refractive properties in all points of scanning (Pic. a), the profile of optic curvature was uneven with elevation in the center (Pic.b), corneal refractive power of steep meridian was 51,0 D, corneal refractive power of flat meridian was 45,9 D (Pic. c), astigmatism was rather regular (Pic. d). A toric IOL sph 10,0 cyl 6,0 D was implanted. Postoperative uncorrected visual acuity was 0,5.



Case 2

Patient S. after keratoplasty had visual acuity OD with correction 0,1 Sph +2,0D Cyl -6,0D 0,4, biometry - 23,58 mm. In actual 3 mm zone the uneven distribution of corneal refractive power was noted (Pic. a, b), difference of corneal refraction of main meridians was 8,5D (Pic. c), astigmatism was rather regular (Pic. d). A toric IOL sph 16,0 cyl 8,0 D was implanted. . Postoperative visual acuity with correction was 0,4 Sph -0,75D Cyl -0,75D 0,5.



Conclusions

For the calculation of the toric IOL optical power the keratotopographic Pentacam data should be used in 3.0 mm zone. To avoid the refractive surprises the irregularity of astigmatism and profile of optical corneal curvature should be considered.

The refractive effect is less prognostic in patients with the multifocal cornea in central zone and marked difference between steep and flat corneal areas.

