Comparison of Keratometry Measurements By High-Resolution Scheimpflug Imaging and Conventional Topography in Normal and Keratoconus Eyes

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Purpose

- Corneal curvature measurement provides crucial information for calculating intraocular lens (IOL) power, screening and managing corneal refractive surgeries, designing, monitoring and assessing the fit of orthokeratology and customized contact lenses. (1)
- Many devices are now available to measure corneal power using different techniques.
- In this study, we aimed to evaluate the difference between the keratometry (K) obtained by High-Resolution Scheimpflug Imaging , and conventional topography in normal and keratoconus eyes.

Introduction

- the most commonly used instruments for measuring corneal topography in clinical practice are computer-assisted videokeratoscopes, many studies have showed the accuracy and repeatability of placido disk–based videokeratoscopes in measuring human cornea. (2)

- The Pentacam uses a rotating Scheimpflug camera to image the anterior segment of the eye. Unlike conventional keratometers, the Scheimpflug device can image both the anterior corneal surface and posterior corneal surface as well as measure corneal thickness. (3)

- To our best knowledge, no other published study compared the keratometry measurements by these two instruments in kertoconus eyes.

Subjects and methods

- The study included two groups: normal and keratoconus.
- Keratoconus was diagnosed either clinically or by corneal topography.
- Keratometry measurements included the flat (Kf), and steep (Ks) k readings.
- Measurments were taken first using the Placido disk-based videokeratography (ALLEGRO Topolyzer VARIO System) and then with the Scheimpflug imaging system (Oculus, Wetzlar,Germany)

Results

Comparison between the two studied groups according to KF, KS

	Topo	Pentacam	P
Kf:			
keratoconus	45.41 ± 3.40	45.28 ± 3.70	0.496
normal	43.33 ± 1.35	42.86 ± 1.32	<0.001*
KS			
keratoconus	48.01 ± 4.81	48.87 ± 5.10	0.001*
normal	44.62 ± 1.78	44.37 ± 1.70	<0.001*

Paired t-test was used

*: Statistically significant at $p \leq 0.05$

Table (2): coefficient of variation(COV), test-re test variability((TVR) and mean difference in both groups

	COV %	TVR	Mean difference
Keratoconus			
KF	0.80(0.16-5.05)	1.05	0.12
KS	1.13(0.12-7.60)	1.51	0.86
Normal			
KF	0.65(0.16-4.28)	0.68	0.47
KS	0.48(0.15-4.15)	0.46	0.26

Discussion

- Accurate measurements of corneal power and astigmatism represents a crucial need requirement in this era of refractive cataract surgery

- In a recent study, errors in keratometry were found to be a significant cause for an IOL exchange due to incorrect lens power (4)

- In the present study , there was statistically significant difference between the keratometry measurments by conventional topography and Scheimpflug imaging in both normal and keratoconus eyes except for KF in keratoconus group

- The COV, TRV and the mean difference were used to evaluate the variability between measurements. They were higher in keratoconus group than normal group.

conclusions

- There is a statistically significant difference between the conventional topography and high resolution Scheimpflug imaging in measuring corneal power.
- The difference is higher in keratoconus than in normal eyes.
- It is inadvisable to use both devices interchangeably in every clinical situation.

References

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