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Independent Validation and Verification of Oculus Keratograph for Measuring Tear Meniscus Height in Ocular Surface Disease Patients

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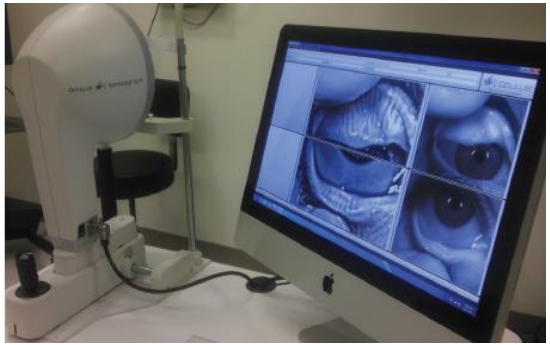
Dr. Abdelfattah	*None*

Purpose

- To determine the validity and reliability of the tear meniscus height (TMH) measurements obtained by the novel Oculus Keratograph 5M.



Patients & Methods

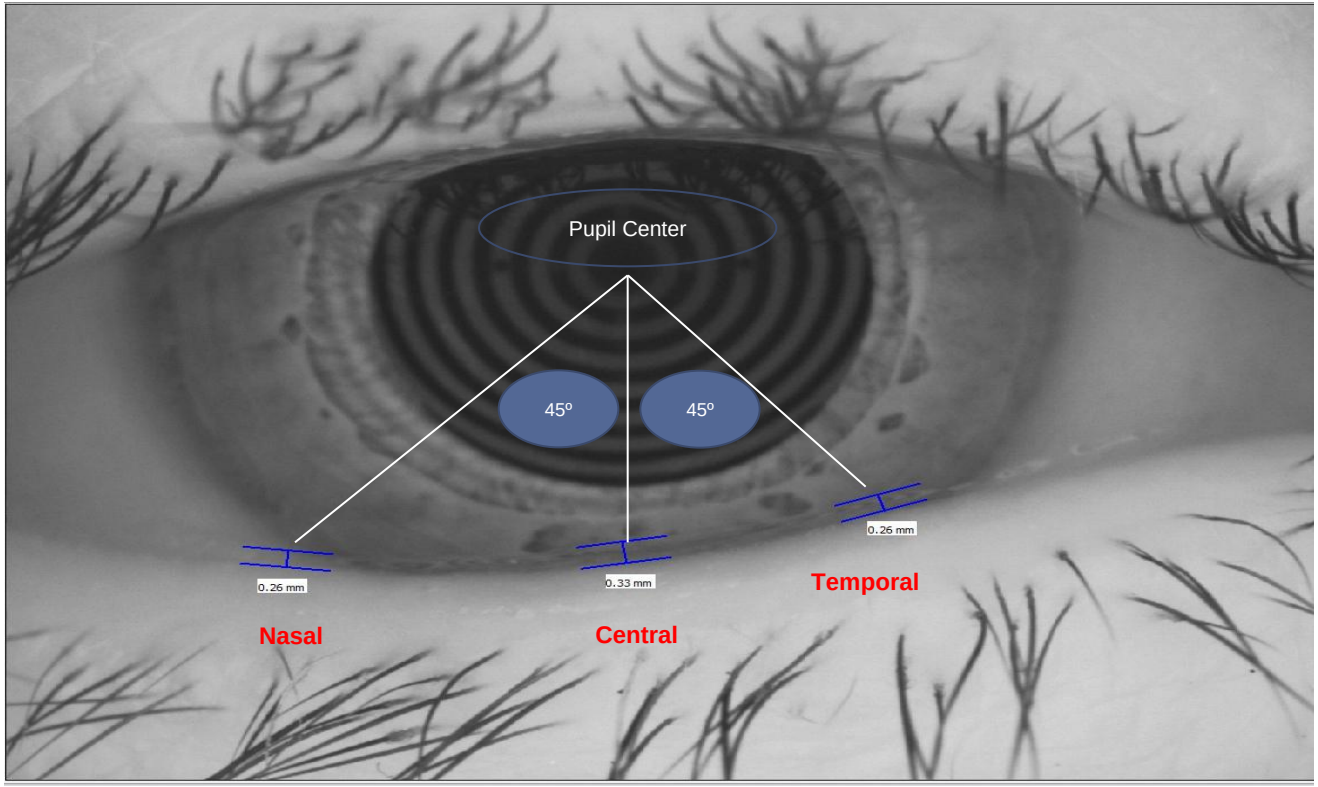
- Sixty-five participants (24 male, 41 female; 111 eyes) were recruited prospectively over 9 months and classified into two groups.

- Group-A consisted of 81 eyes of patients aged 64.1 ± 13.6 years with clinically diagnosed ocular surface disease.

- Group-B included 30 normal control eyes of subjects aged 34.8 ± 10.5 years.

Methods

- All eyes were imaged non-invasively with the Oculus K5M (Wetzlar, Germany) using the TMH tool.
- Based on infrared imaging of the tear film at the lid margin, automated analysis of the TMH at 3 points along the lid margin (central, nasal, and temporal) were generated by the instrument's software.
- For comparison, fluorescein was used to stain the tear lake and TMH was manually graded based on images captured on the Oculus using its integrated cobalt blue light.
- Measurements of central and average TMH (mean of three points) were compared for validity against fluorescein TMH readings.


Pupil Center
45º
45º
0.26 mm
0.33 mm
0.26 mm
Nasal
Central
Temporal

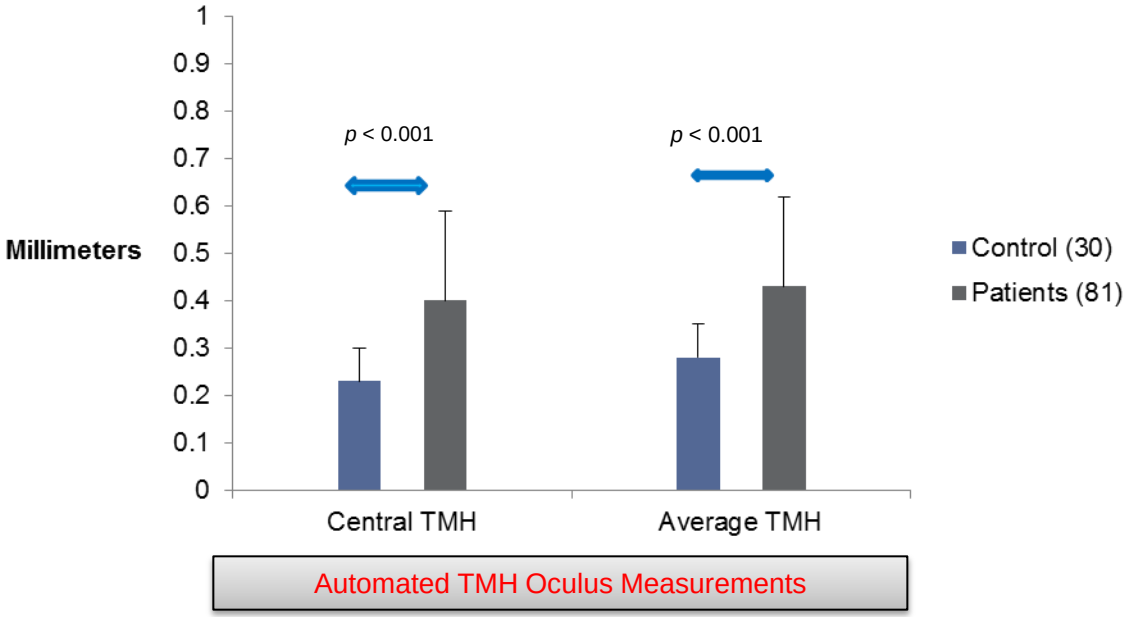
Results

- Standard fluorescein TMH readings confirmed lower TMH values in eyes affected with ocular surface disease as compared to normal controls (0.24 mm versus 0.4 mm, $r = 0.2$, $p < 0.001$).

- However, mean readings for automated central TMH and average TMH for group-A were found to be significantly higher than group-B (0.39 and 0.43 mm versus 0.27 and 0.32 mm respectively, $r = 0.1$, $p < 0.001$).

- No correlation was found between automated TMH measurements generated by the Oculus Keratograph 5M analysis software and manually graded TMH based on fluorescein staining in both groups examined ($r = 0.08$, $p < 0.001$).

Results


Millimeters
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
p < 0.001
p < 0.001
Central TMH
Average TMH
Control (30)
Patients (81)
Automated TMH Oculus Measurements

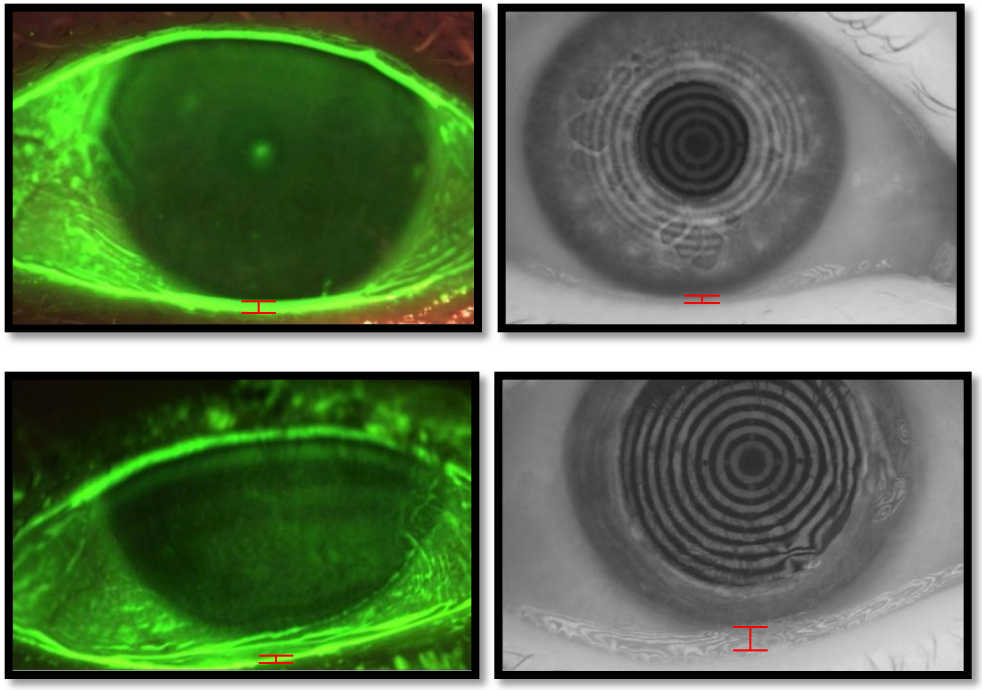
Discussion

Patient examination revealed a noticeable discrepancy between the TMH recorded on the Oculus, versus TMH examined by the Slit Lamp with fluorescein instillation.

This led to assumption that the high reflectivity area visible on the lid margin in TMH Mode is not the tear meniscus of the eye.

Control Subject

Dry Eye Patient



Conclusions

- The Oculus Keratograph 5M is able to provide automated TMH values without the use of fluorescein and cobalt blue light.

- However, the automated TMH values are higher in eyes with ocular surface disease than in normal control eyes and do not concur with traditional fluorescein TMH measurements.

- While not a reliable tool for TMH measurement, infrared images of the tear meniscus generated by the Oculus Keratograph 5M may be useful for other modalities of studying ocular surface disease.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