

Oral Abstract Presentation

OP-1 QUANTITATIVE EVALUATION OF RADIAL KERATITIS IN ACANTHAMOEBA KERATITIS USING ANTERIOR SEGMENT OPTICAL COHERENCE TOMOGRAPHY: IMPLICATIONS FOR A THERAPEUTIC END-POINT

¹Grace Kiew*, ²Ria Reddy, ¹Bhagyashree Joshi, ^{1,2}Harinderjeet Sandhu, ^{1,2}Parwez Hossain. ¹Eye Unit, Southampton General Hospital, University Hospitals Southampton NHS Trust, Southampton, UK; ²Clinical Experimental Sciences, Faculty of Medicine, University of Southampton, Southampton, UK; *Grace.Kiew@uhs.nhs.uk

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Purpose Acanthamoeba keratitis (AK) is a sight-threatening condition associated with contact lenses. Early diagnosis and therapy response assessment remain clinical challenges. Recent studies suggest that anterior segment optical coherence tomography (AS-OCT) can detect radial keratoneuritis (RK) in AK. Despite this, it is unclear if the presence of RK or quantitative RK parameters are clinically useful. Using AS-OCT, we detected RK changes in patients with AK throughout their clinical course, from presenting symptoms to treatment resolution.

Methods A retrospective observational clinical study was conducted to assess changes in RK during the AK clinical course using AS-OCT. In 26 patients with confirmed AK on confocal microscopy or culture, serial AS-OCT imaging was performed at presentation and multiple time points until infection resolution. Measurements were taken at each visit to determine the length, width and depth of the RK.

Results 61.5% of patients had multiple inflamed nerves in the form of RK at presentation. There were 11 patients with complete clinical data series showing RK which were subsequently analysed. Mean RK length showed a significant decrease from 516 μm on day 0 (time of presentation) to 309 μm on day 111 ($p=0.030$). Mean RK width decreased from 64 μm (day 0) to 34 μm (day 111; $p=0.016$), and mean RK depth reduced from 421 μm (day 0) to 275 μm (day 111; $p=0.002$). The resolution of RK coincided with improvement of symptoms.

Conclusion This study provides additional evidence supporting the use of AS-OCT in detecting RK in patients with AK. The measurement of RK over time in AK offers an objective method for monitoring clinical response

OP-2 BOWMAN'S LAYER IN HEALTH, KERATOCONUS AND OTHER CORNEAL CONDITIONS

¹Alfredo Borgia*, ²Samuel Lawman, ¹Colby Hart, ¹Matteo Posarelli, ³Mahmoud Ahmed, ³Alexander Undan, ²Yalin Zheng, ²Yaochun Shen, ¹Andrea Madden, ³Sharon Mason, ³Rose Hebert, ^{1,3}Stephen Kaye. ¹Department of Ophthalmology, Royal Liverpool University Hospital, Liverpool, UK; ²Faculty of Science and Engineering, University of Liverpool, Liverpool, UK; ³Department of Eye and Vision Science, University of Liverpool, Liverpool, UK; *alfr.borgia@gmail.com

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Purpose To investigate the central thickness of Bowman's layer in patients with keratoconus, healthy cornea and other corneal conditions in relation to corneal curvature and, epithelial and total corneal thickness in health, keratoconus (KC) and Fuchs' endothelial corneal dystrophy (FED).

Methods Patients with keratoconus, FED and other dystrophies, and healthy subjects were included. Linnik and Mirau

ultra high axial resolution line field spectral domain optical coherence tomography (UHR-OCT) devices were used to image the cornea, in addition to commercially available OCT and Scheimpflug devices. Measurements were undertaken in triplicate for each device at entry and then repeated at 3 and 6 months. A supervised automated segmentation process was used to extract the quasi-point thickness of the Bowman's layer in the central cornea from the collected UHR-OCT images.

Results 37 patients with KC, 33 with FED and other corneal dystrophies and 18 healthy subjects were included. Central BT 14.32 μm (SD:1.66) in KC, 15.45 (SD 1.88) in health and 15.20 (1.42) in FED. Central Bowman's layer thickness, was associated with CCT ($p<0.001$ Bowman's layer being $\sim 3\%$ of measured CCT), but not with age ($p=0.25$), diagnosis ($p=0.81$), sex ($p=0.18$), Kmax ($p=0.37$) or epithelial thickness ($p=0.79$). The ratio of BT to CCT was independent of diagnosis ($p=0.85$), age ($p=0.72$), sex ($p=0.21$) Kmax ($p=0.53$) and epithelial thickness ($p=0.93$). There was a significant association between epithelial thickness and the ratio of Kmax to CCT ($R^2=0.63$, $p<0.001$).

Conclusions Changes to Bowman's layer appear to be concurrent with changes in the corneal stroma. The ratio of BT to CCT is independent of age, sex, Kmax, epithelial thickness or diagnosis and may be a useful index.

OP-3 DEEP-LEARNING IDENTIFICATION OF STROMAL HYPERREFLECTIVITY ON AS-OCT AND ITS INFLUENCE ON VISUAL OUTCOMES AFTER DMEK SURGERY

¹Matteo Airdi*, ²Xu Chen, ¹Alfredo Borgia, ²Yalin Zheng, ^{1,2}Stephen B Kaye. ¹St. Paul's Eye Unit, Liverpool University Hospitals NHS Foundation Trust, Liverpool, UK; ²Department of Eye and Vision Sciences, Institute of Life Course and Medical Sciences, University of Liverpool, Liverpool, UK; *matteo.airaldi@liverpoolft.nhs.uk

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Purpose To assess the influence of preoperative stromal hyperreflectivity on visual outcomes of Descemet Membrane Endothelial Keratoplasty (DMEK) surgery.

Design Monocentric, cohort study.

Methods Anterior Segment Optical Coherence Tomography (AS-OCT) imaging of eyes which underwent uncomplicated DMEK surgery at the Royal Liverpool University Hospital were collected before and after surgery. Patient electronic records were reviewed to collect visual acuity outcomes. A deep-learning algorithm was developed to segment the corneal boundaries and identify clusters of hyperreflectivity. The loss function utilised in this study was a combination of dice loss and cross-entropy loss and an Adam-based optimizer was employed for optimisation.

Results A total of 19 eyes from 18 patients were analysed. Visual acuity improved in all eyes after DMEK (mean [SD], 0.59 [0.31] vs. 0.26 [0.22] LogMAR, $p<0.001$). Stromal hyperreflectivity correlated with preoperative central corneal thickness ($p=0.88$, $p<0.001$) but not with preoperative visual acuity ($p=0.11$, $p=0.65$). At 6 months after DMEK surgery, patients with preoperative stromal hyperreflectivity higher than the median values had lower final visual acuity than those with lower values of stromal hyperreflectivity (mean [SD], 0.29 [0.3] vs. 0.23 [0.12] LogMAR, $p<0.04$).

Conclusions Clusters of stromal hyperreflectivity can be identified and monitored with deep-learning based segmentation