

## 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**

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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  $\mu\text{m}$  on day 0 (time of presentation) to 309  $\mu\text{m}$  on day 111 ( $p=0.030$ ). Mean RK width decreased from 64  $\mu\text{m}$  (day 0) to 34  $\mu\text{m}$  (day 111;  $p=0.016$ ), and mean RK depth reduced from 421  $\mu\text{m}$  (day 0) to 275  $\mu\text{m}$  (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**

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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 $\mu\text{m}$  (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**

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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

algorithms. Preoperative stromal hyperreflectivity was associated with lower visual acuity recovery after DMEK surgery. Tools to identify stromal hyperreflectivity corresponding to clinical stromal scarring can help clinicians in stratifying candidate patients for DMEK and gauging the expected visual acuity recovery rate.

#### OP-4 CHARACTERISING MIRVETUXIMAB-INDUCED OCULAR SURFACE DISEASE

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**Background** Mirvetuximab soravtansine (MIRV) is the first antibody-drug conjugate targeting folate receptor alpha recently approved for use in advanced platinum-resistant ovarian, fallopian tube or primary peritoneal cancer and is rapidly gaining popularity. This study aims to report the clinical features, treatment strategies and outcomes of MIRV-induced ocular surface disease.

**Methods** Ten patients were included from Aug 2017 - October 2023. Ocular symptom assessment and comprehensive ophthalmic examination, including slit lamp biomicroscopy, anterior segment optical coherence tomography (AS-OCT), and confocal microscopy were performed.

**Results** All patients were female treated for advanced ovarian cancer (mean age  $66.7 \pm 5$  years). Seven (70%) had grade 1–2 superficial punctate keratopathy. Five (50%) developed bilateral mid-peripheral microcystic subepithelial opacities, two of which progressed to involve the central cornea. AS-OCT confirmed the corneal opacities were limited at the subepithelial layer. Confocal microscopy demonstrated a rosette pattern for these subepithelial opacities. Two required MIRV dosage reduction due to ocular adverse events. No discontinuation of MIRV was necessary. Ocular surface and corneal changes resolved with recovery to baseline best corrected visual acuity for all patients.

**Conclusion** Dry eyes and microcystic subepithelial changes were the commonest MIRV-induced ocular adverse events but these were transient and reversible. We hypothesise the insult and centripetal migration of transient amplifying cells (TACs) to be responsible for the pathogenesis but further investigation is required. Prophylactic use of topical corticosteroid which delays TACs migration is recommended for all patients starting on MIRV. MIRV dosage reduction for patients with more severe ocular surface disease resulted in good resolution of symptoms.

#### OP-5 INCREASED INCIDENCE OF ADULT GONOCOCCAL KERATOCONJUNCTIVITIS AT TWO TERTIARY EYE HOSPITALS IN WESTERN EUROPE: CLINICAL FEATURES, COMPLICATIONS AND ANTIMICROBIAL SUSCEPTIBILITY

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**Introduction** Gonorrhoea is on the rise. Between 2021 and 2022, sexual health services saw a 50% and a 33% increase

in diagnoses respectively in England and The Netherlands. A concurrent rise in gonococcal keratoconjunctivitis (GKC) is a serious concern due to the potentially devastating visual complications, yet there is limited national epidemiology on GKC, including on antimicrobial susceptibility. This increase coincides with a major public health concern; *N. gonorrhoeae* is evolving high levels of antimicrobial resistance, including to ceftriaxone, the last available option for empirical therapy.

**Method** A descriptive, retrospective case series was conducted in two tertiary referral centres; Moorfields Eye Hospital, London, UK and Rotterdam Eye Hospital, Rotterdam, The Netherlands between 2017 and 2023.

**Results** There was simultaneously increased incidence of adult GKC in both centres, with 11 cases confirmed in the first seven months of 2023, compared to  $\leq 3$  per year in 2017–2022. The clinical features, ocular complications and antimicrobial susceptibilities are reported.

**Conclusions** There was a notable increase in the incidence of GKC cases in our centres in 2023, which may indicate a rise across Western Europe. Emergency departments need a heightened awareness to identify and treat cases at first presentation, even in individuals without identifiable risk factors. Nationwide studies of the incidence, clinical features, risk factors, management, complications and antimicrobial resistance of adult patients with GKC have been proposed in both countries for 2024. In the UK this will be facilitated by the British Ophthalmological Surveillance Unit (BOSU) in association with the UK Health Security Agency.

#### OP-6 THE INVOLVEMENT OF CORNEAL NERVES IN THE PATHOGENESIS OF KERATOCONUS

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**Purpose** To study the morphologic characteristics of corneal nerves in patients with advanced keratoconus using the acetylcholinesterase technique in corneal whole mounts.

**Design** Prospective, observational case series.

**Methods** Fourteen corneal buttons from 14 keratoconic patients (9 males and 5 females; mean age, 34.3 years) who had undergone keratoplasty for advanced keratoconus and 6 corneal buttons from 6 normal corneas were included. Whole mounts were stained for acetylcholinesterase and were scanned with a novel Nanozoomer digital pathology scanning microscope.

**Results** Seventy-one percent of keratoconic corneas demonstrated central stromal nerve changes, which included thickening, tortuosity, nerve spouting, and overgrowth. The nerve changes ranged from early to extensive and could be separated into 3 different grades. The central stromal nerves were abnormally thicker ( $18.9 \pm 14.7 \mu\text{m}$ ) than in controls ( $8.11 \pm 3.31 \mu\text{m}$ ;  $p < .001$ ). The thickness of peripheral stromal nerves ( $12.6 \pm 3.1 \mu\text{m}$ ) was similar to that of controls ( $14.86 \pm 5.60 \mu\text{m}$ ;  $p = .072$ ). Subbasal nerves showed changes in the form of loss of radial orientation and increased tortuosity, especially at the cone apex. At the cone base, a concentric arrangement of subbasal nerves was found in 43% of cases. Localized thickenings of subbasal nerves also were observed at their origin from the bulbous terminations of sub-Bowman nerves. The terminal bulbs, too, were enlarged. The mean