BOWMAN Club

25th March 2022

St John's College

Cambridge

Abstract book

BOWMAN CLUB 2022 Abstracts

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BOWMAN CLUB 2022 Abstracts

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1 Conjunctival genetic 'fingerprinting' in ocular mucous membrane pemphigoid

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Objective: Ocular Mucous Membrane Pemphigoid (OcMMP) is a rare disease characterised by chronic autoimmune-driven conjunctival inflammation leading to progressive scarring, and blinding sequelae. The purpose of this study was to characterise the conjunctival gene 'fingerprint' involved in the fibrosis signalling pathways in the pathogenesis of OcMMP.

Methods and analysis: Ocular surface gene expression studies were undertaken on conjunctival swabs from OcMMP and age-matched control patients. The NanoString nCounter Human Fibrosis panel (NanoString Technologies Inc.) quantified RNA expression from 770 genes. Differentially expressed genes (DEG) and pathway analysis were determined using HyperScale architecture designed by ROSALIND, Inc. with normalisation, fold changes (≥+1.5-fold or ≤−1.5-fold) and p-values adjustment (<0.05) using the Benjamini-Hochberg method. Significantly identified genes were aligned to the aldehyde dehydrogenase (ALDH)/retinoic acid fibroblast autoregulation conjunctival scarring signalling pathway, known to be central to immune-mediated mucosal scarring in OcMMP.

Results: 6 OcMMP patients (8 eyes, mean age 76.5 (±7.0 SD) years, 6 (66%) male, 3 (50%) biopsy-positive) and 8 age-matched cataract patients (15 eyes; age 73.1 (±9.3) years, 3 (37%) male), serving as controls were analysed. Ninety-three DEGs were observed between OcMMP and controls (48 upregulated and 45 downregulated). Of these, the top 10 upregulated DEGs were COL3A1, COL1A1, FN1, TPSAB1/B2, THBS1, SERPINE1, SPP1, COL5A1, OASL and IL1B. 44 pathways that had a global significance score greater or equal to 2, the most significant representing extracellular matrix (ECM) remodelling, synthesis, and degradation.

Conclusion: The conjunctival genetic 'fingerprint' predominantly suggests an activated fibroblastic phenotype in the OcMMP patients and could represent (i) novel targets for drug discovery and (ii) surrogate outcomes/novel biomarkers for the monitoring of disease progression.

2 Long-term outcomes of rebubbling and graft detachment in Descemet membrane endothelial keratoplasty using a standardised protocol

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Objective: To analyse risk factors and long-term outcomes after rebubbling and graft detachment in Descemet membrane endothelial keratoplasty (DMEK).

Methods and analysis: 176 consecutive DMEK grafts of 125 patients performed by 8 surgeons with a standardised technique between January 2015 and January 2022 were analysed. Main outcome measures were graft detachments, rebubbling rate, postoperative outcomes, and risk factors for graft failure and rebubbling.

Results: 6 (3.4%) grafts required rebubbling (<1/3 detached). 41 (23%) grafts developed self-resolving partial detachments (<1/3detached). 5-year graft survival were 96%, 87%, and 83% in fully attached, partially detached and rebubbled eyes. Mean best spectacle corrected visual acuity (BSCVA) at last follow-up were 0.00±0.34, 0.14±0.25, and 0.18±0.19 logMAR (p=0.266) in fully attached, partially detached and rebubbled eyes. Percentage endothelial cell loss (ECL) was 57.5±14.1, 57.9±14.2, and 68.8±8.8 (p=0.035) in fully attached, partially detached and rebubbled eyes. Graft failure occurred in 9 (5.1%) eyes: 3 grafts had primary failure, 2 had early failure (<3 months), 2 had late failure (<12 months), and 2 grafts did not fully unfold intraoperatively. Intraoperative trauma (score) was a risk factor for graft failure (HR 1.81; 95% CI: 1.33 – 2.50 (p=0.0229)). Indication for surgery was a risk factor for rebubbling (HR 5.28; 95% CI: 5.11 – 72.4 (p=0.00703)).

Conclusion: DMEK grafts had better graft survival if there was no partial detachment or rebubbling up to 5 years postop. There was significant ECL associated with rebubbling. A standardised technique reduces rebubbling and graft failure risk.

3 Personalised model to predict keratoconus progression from demographic, topographic and genetic data

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Objective: To generate a personalised prognostic model to predict keratoconus progression to corneal collagen cross-linking (CXL).

Methods and analysis: In this retrospective cohort study, we recruited 5,025 patients (9,341 eyes) with early keratoconus between January 2011 and November 2020. Genetic data from 926 patients was available. We evaluated both change in keratometry or CXL as indices of progression and used the Royston-Parmar method on the proportional hazards scale to generate a prognostic model. We calculated hazard ratios (HR) for each significant covariate, with explained variation and discrimination.

Results: After exclusions, model-fitting comprised 8,701 eyes, of which 3,232 underwent CXL. For early keratoconus CXL provided a more robust prognostic model than keratometric progression. The final model explains 33% of the variation in time-to-event age HR [95% confidence limits] 0.9 [0.90-0.91], maximum anterior keratometry (Kmax) 1.08 [1.07-1.09], and minimum corneal thickness 0.95 [0.93-0.96] as significant covariates. Single nucleotide polymorphisms (SNPs) associated with keratoconus (n=28) did not significantly contribute to the model. The predicted time-to-event curves closely followed the observed curves during internal-external validation.

Conclusions: A prognostic model to predict keratoconus progression could aid patient empowerment, triage and service provision. Age at presentation is the most significant predictor of progression risk. Candidate SNPs associated with keratoconus do not contribute to progression risk.

4 Descemet membrane endothelial keratoplasty patching (DMEP) - selective endothelial replacement in eyes with localised endothelial dysfunction

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Objective: To report the clinical outcomes of a series of cases in which localised areas of endothelial function were selectively treated with shape and position matched endothelial transplanted in a procedure we have termed Descemet's membrane endothelial patching (DMEP).

Methods: Interventional case series. Five patients presented with localised endothelial dysfunction in eyes with high-risk graft failure due either to rejection, recurrence of the focal endothelial dysfunction or because extended treatment with steroid drops was contraindicated. Endothelial grafts matching the area of dysfunction were produced to preserve healthy host cells and limit the immunological burden of new grafts. Patient demographic details, indication for surgery, preoperative and postoperative visual acuity, intraoperative and postoperative complications, and graft rejections episodes were noted.

Results: Five patients were included in this cases series. Indications for DMEP were Fuchs' heterochromic iridocyclitis (n=1), Fuchs' endothelial dystrophy (n=2), endotheliitis (n=2). In all cases, a customised DMEP graft was used, as opposed to our standard 8.25mm circular DMEK graft size. The DMEP grafts were centred over the area of focal endothelial dysfunction. In all cases, complete graft attachment was achieved, and the corneas were cleared. Steroid drops were reduced rapidly without any episodes of graft rejection/failure reported at 1 year.

Conclusion: DMEP transplants are a viable option to treat localised endothelial dysfunction. Placing non-circular, no central transplants is surgically feasible and does not appear to affect graft adhesion. Limiting the size of the transplant may limit the immunological burden of new grafts and reduce the need for extended courses of steroids.

5 Femtosecond enabled keratoplasty techniques for keratoplasty

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Objective: To present a case series evaluating the role of the femtosecond laser in a range of keratoplasty techniques, and evaluation of the Victus femtosecond laser (Bauch & Lomb) software version 3.4 in a range of procedures.

a) Femtosecond assisted descemetorhexis for DMEK.
b) Use of modified hyaluronate augmentation to allow trephination in eccentric or thin corneas including desmetocele, for DALK.
c) Use of femtosecond trephination to allow mushroom configuration with simplified Big bubble DALK tunnel creation.
d) Post keratoplasty intrastromal astigmatic keratotomy.

Methods: Surgical and clinical case review including video.

Results and conclusions: The femtosecond laser platform provided a configurable tool with wide ranging applications in corneal surgery. Modifications to manual techniques utilising femtosecond laser offers some surgical benefits.

6 Preloaded Descemet membrane endothelial keratoplasty grafts with endothelium outward

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Purpose: To validate the "Descemet membrane endothelial kerato-plasty (DMEK) Rapid" device for the cross-country transportation of preloaded DMEK grafts preserved with endothelium outward.

Methods: DMEK grafts were stripped and loaded in the DMEK Rapid device with tissue culture medium (TCM) or transport medium (TM) with endothelium outward. The device was mounted in a 40-mL flask and preserved for 4 days on a rocker to simulate transportation (study A, n=24) or shipped in the TM from Italy to the United Kingdom (study B, n=9) and evaluated within 72 hours. All the tissues were stained with Alizarin red. Viability of the cells was checked post-simulations and post-transportation and was confirmed using live/dead staining. Expression of tight junction proteins was evaluated.

Results: In study A, the endothelial cell loss observed from the TCM group was 20.8% (65.2) compared with 19.5% (66.7) from the TM group (p=0.41) after transport simulation. Alizarin red showed minimal uncovered areas in both groups. There were no statistical differences in viability between the TM (80.83%) and TCM groups (78.83%). In study B, 12.9% (67.8) endothelial cell loss was observed after transporting the tissues from Italy to the United Kingdom with no significant difference between pre-strip and post-transportation (p=0.05). Alizarin red staining did not show any uncovered area. Live/dead analysis showed 85.16% cell viability after transportation. zonula occludens-1 (ZO-1) was expressed in all tissues.

Conclusions: The DMEK Rapid device is safe for preloading and shipping DMEK grafts internationally with endothelium outward within 72 hours when preserved in the transport media.

7 Our experience of DMEK wet lab-training course as a precursor to starting DMEK service at NHS Trusts during COVID-19 pandemic in UK

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Objective: The benefits of simulation model and wet lab training courses have been well publicised. We were keen to introduce DMEK service in our NHS trust and put simulation and wet-lab training courses to the test for corneal consultants.

Methods: We designed and held DMEK wet lab courses using human donors and the simulation model and wet lab training for consultants. We collected surveys pre- and post- wet lab course attendance. We also recorded their performance times. We used human research grade corneas and Phillip DMEK, Kitaro model eye, artificial anterior chambers for consultants.

Results: All participants had practiced all the steps of DMEK and improved performance times. All reported to have increased confidence level as a direct result of the wet lab courses. All steps of DMEK surgery except graft manipulation were closely simulated to real-life surgery on patients. Out of the six consultants participating, two started DMEK services in their respective NHS trusts in the following month, with others planning to start DMEK services in the coming months.

Conclusions: The benefits of simulation and wet lab training is particularly valuable during the COVID-19 pandemic, which drastically reduced the availability of donor cornea, thus grinding to a halt corneal graft surgery nationally for many months. Surgeons, regardless of grade (beginner to advanced) can keep their skills up using wet lab and simulation. This setting also improves safety for patients.

8 Corneal neurotisation using the greater auricular nerve: a novel solution for congenital trigeminal anaesthesia

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Objective: We present an indirect corneal neurotisation (CN) technique using the greater auricular nerve (GAN) for bilateral congenital trigeminal anaesthesia (CTA) due to pontine tegmental cap dysplasia (PTCD). This was the first time this technique was performed for PTCD.

Methods: A 4-year-old boy with PTCD presented with severe neurotrophic keratopathy with dense scarring and recurrent ulcerations despite full medical treatment and multiple supportive surgical interventions. He underwent CN for his only seeing eye using a harvested autologous sural nerve as an inter-positional nerve graft coapted to the ipsilateral GAN and tunnelled subcutaneously to the inferior fornix. The distal end of sural nerve was fashioned into multiple fascicles and secured into the prepared perilimbal space across all four quadrants.

Results: The postoperative course was uneventful. The presence of corneal sensation was noted at 3 months; 6 months there was an improvement in vision subjectively enabling the patient to perform more visually demanding tasks at school. By 12 months the corneal opacities reduced in size and density and epithelium maintained a healthy appearance.

Conclusion: This novel technique has the potential to provide corneal sensation and trophic function in bilateral CTA. It offers some advantages over the direct CN approach and indirect techniques using supratrochlear/supraorbital nerves as donors which cannot be used in bilateral trigeminal anaesthesia. The GAN originates from the cervical plexus; it has higher axon counts due to its larger size offering a more robust neurotisation; it avoids extensive facial dissection. Our patient successfully gained corneal sensation and vision.

9 Subconjunctival silicone oil - presentation, histology and surgical management

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Objective: To describe the clinical and histological findings in subconjunctival silicone oil leakage, and a surgical technique for its management.

Method: A 60-year-old woman with a chronic macula-off detachment underwent two pars plana vitrectomies four months apart. The silicone oil inserted during the first was replaced by heavy silicone (Oxane HD) at the second, with unsutured sclerostomy ports. One month later silicone oil cysts were noted under the conjunctiva.

Results: Symptoms were grittiness, dryness and heaviness with occasional severe pain. Multiple oil globules 0.2 -2mm in diameter were tightly packed beneath the conjunctiva in two quadrants, extending from limbus to peripheral bulbar conjunctiva.

Tenons tissue containing silicone globules was isolated by dissecting planes superficially, immediately beneath the conjunctival basement membrane, and deep, immediately above the sclera. The tissue sheet was mobilised and excised posteriorly at the junction with healthy tissue.

Histology revealed sheets of connective tissue with densely packed tiny lacunae, and intermittent large lacunae with fibrous walls. Inflammatory cells were scattered in between.

Discussion: Injectable medical grade silicone oil is only approved for intravitreal use. When injected into breasts, buttocks or face, or following implant rupture, it can migrate causing inflammation, contracture, calcification, embolism and death. It is difficult to remove surgically as it is viscous and adherent, requiring surfactants.

Conclusion: Leakage of silicone oil from a sclerostomy is a rare complication of intravitreal use. It densely infiltrates subconjunctival tissues, causing irritation and heaviness. With careful dissection, the tissues can be removed en bloc with resolution of symptoms.

10 Gut microbiota dysbiosis as a driver of inflammation in ocular mucous membrane pemphigoid

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Objectives: Mucous membrane pemphigoid is an orphan multi-system autoimmune scarring disease involving mucosal sites, including the ocular surface (OcMMP) and gut. The gut microbiome plays a critical role in the development of the immune system. This study examines the relationship between gut microbiome diversity and ocular inflammation in patients with OcMMP.

Methods and analysis: Gut microbiome profiles between OcMMP patients (n=49) and healthy controls (n=40) were compared by extracting DNA from faecal samples and amplified for the V4 region of the 16S rRNA gene followed by Illumina Miseq platform sequencing. Sequencing reads were processed using the bioinformatics pipeline available in the mothur v.1.44.1 software.

Results: Using multivariable model and adjustment for participant factors, the OcMMP cohort was found to be associated with lower number of operational taxonomic units (OTUs) and Shannon Diversity Index when compared to healthy controls. OcMMP OTUs were found to be significantly correlated with both the bulbar conjunctival inflammation score (p=0.03) and the current use of systemic immunotherapy (p=0.02). Linear discriminant analysis effect size scores found *Streptococcus* and *Lachnoclostridium* enriched in OcMMP. By contrast, healthy controls were enriched with *Oxalobacter*, *Clostridia* uncultured genus-level group (UCG) 014, *Christensenellaceae* R-7 group and butyrate-producing bacteria such as *Ruminococcus*, L*achnospiraceae*, *Coprococcus*, *Roseburia*, *Oscillospiraceae* UCG 003, 005, NK4A214 group (Log10 LDA score < 2, FDR-adjusted p <0.05).

Conclusion: In conclusion, OcMMP patients have gut dysbiosis that correlated with bulbar conjunctival inflammation and the use of systemic immunotherapies. This provides a framework for future longitudinal deep phenotyping studies on the role of the gut microbiome in the pathogenesis of OcMMP.

11 Topical insulin in the management of persistent corneal epithelial defects

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Objective: To evaluate the effectiveness of insulin eye drops for treating refractory persistent epithelial defects (PEDs).

Methods and analysis: A prospective, interventional, single-centre, case series was performed from March 2020 to September 2021. All patients were prescribed insulin eye drops for the treatment of PEDs, which failed on maximum standard medical and surgical treatment. Patients were prescribed the drops to take four times daily for two months. Patients were followed up at 2-weekly intervals with full slit lamp examination and serial anterior segment photography. Primary end points were the rate and time to resolution of the defect.

Results: 11 eyes of 10 patients were treated. Mean age of the cohort was 45.4 +25 years with a mean follow-up of 142.3 + 97.3 days from initiation of insulin. The most common causative condition of PED was chemical injury (n=5, 60%). Mean PED defect area at initiation of insulin was 41.3 +55.2 mm^2. 9 out of 11 eyes (82%) fully re-epithelised within a mean time of 62.3 +34.6 days (range 14-112). In the two patients who did not achieve re-epitheliastion, one had a reduction in size from 12.25mm^2 to 4.5mm^2 and the other had no response. No recurrence in epithelial defect was observed in those that re-epithelialised.

Conclusion: This study shows that the use of topical insulin led to a successful resolution of PED in 9 of the 11 cases. This is the first reported study to demonstrate the use of insulin drops for closure of PEDs in chemical eye injury.

P1 A case of Descemet's membrane detachment following penetrating keratoplasty for keratoconus

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Objective: To present an uncommon case of Descemet's (DM) detachment 20 years following PK for keratoconus. The detachment spontaneously resolved with conservative management.

To review the literature and published case reports for the clinical course, prognosis, and managements employed for DM detachment following PK.

Methods and analysis: Case presentation of a patient presenting to our department and review of the literature.

Results: Our patient presented with a spontaneous DM detachment 20 years after an uncomplicated PK for keratoconus. Imaging showed recurrence of corneal ectasia inferiorly, which would give this patient a poorer prognosis and higher risk of re-detachment after surgical intervention for the detachment. We opted for conservative management, after which the DM detachment spontaneously resolved and corneal thickness improved.

DM detachment is an uncommon late complication of PK and pathophysiology is thought to be mechanical due to a retrocorneal membrane, or due to recurrence of corneal ectasia. The majority of published cases underwent surgery with air, SF6, or C3F8 with postoperative supine positioning, or progression to repeat PK or DSAEK if this initial treatment fails. Topical steroids can be given for conservative management.

Conclusion: Conservative management of DM detachment can be an option for patients with guarded prognosis, or in small detachments with no tears. Our case provides another data point on the presentation and progression of this complication to the small number of case reports in the literature.

P2 Trans-epithelial phototherapeutic keratectomy (PTK) for recurrent corneal erosion syndrome (RCES)

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Objective: To evaluate the efficacy and safety of trans-epithelial phototherapeutic keratectomy (PTK) as a treatment for recurrent cornea erosion syndrome (RCES) in patients with symptoms refractory to conventional treatments.

Methods and analysis: All patients who received PTK treatment for RCES had failed more than one conventional treatment, and were first vetted and approved by the British Columbia public health authority. A retrospective chart review and telephone survey were conducted at the Pacific Laser Eye Centre. Exclusion criteria were ocular co-morbidities potentially affecting treatment efficacy.

Results: This study included 593 eyes of 555 patients (46.2% male; 50.9±14.2 years old) who underwent PTK. The leading identified causes of RCES were trauma (45.7%) and anterior basement membrane dystrophy (44.2%). The most common pre-PTK interventions were ocular lubricants (90.9%), hypertonic solutions (77.9%), and bandage contact lenses (50.9%). 36 eyes had undergone surgical interventions such as stromal puncture, epithelial debridement, or diamond burr polishing. Post-PTK, 78% of patients did not require any subsequent therapies, 20% required ongoing drops and 6 patients (1.1%) reported no symptom improvement. All 6 eyes were successfully retreated with PTK between 11.3±14.9 months from initial PTK. All study patients showed no significant differences in best corrected visual acuity pre vs. postoperatively.

Conclusion: When compared to other surgical options, PTK is potentially more costly but frequently more effective and has a high safety profile. The third-party public health vetted nature of this study, the high patient satisfaction, and the low recurrence rate of RCES suggest that PTK should be considered at an earlier stage in the management of RCES.

P3 Descemet stripping endothelial keratoplasty versus Descemet membrane endothelial keratoplasty: 5-year graft survival and endothelial cell loss in patients with Fuchs' endothelial dystrophy

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Objective: To compare endothelial cell loss, graft survival, and clinical outcomes in patients with Fuchs' endothelial dystrophy (FED) up to 5 years after Descemet stripping endothelial keratoplasty (DSEK) and Descemet membrane endothelial keratoplasty (DMEK).

Methods: 318 consecutive DSEK (n=189) and DMEK (n=129) grafts of 223 patients performed by 8 surgeons with standardised protocols between January 2006 and October 2021 were analysed. Group differences were compared with parametric and non-parametric tests. Kaplan-Meier analysis and Cox regression were conducted for graft survival and identify graft failure and rejection risk factors.

Results: At 5 years, graft survival was 97% and 98% (p=0.370) in DSEK and DMEK eyes. Mean percentage endothelial cell loss was 56.6±17.6 in DSEK and 55.6±15.2 in DMEK eyes (p=0.865). Mean BSCVA was 0.12±0.13 LogMAR in DSEK and 0.00±0.17 in DMEK grafts (p<0.00001) at 5 years postop. Within 5 years, 12% of DSEK and 9% of DMEK eyes developed allograft rejection (p=0.412). Rebubbling was performed in 9.0% of DSEK and 2.3% of DMEK grafts (p=0.211). Cox regression identified rejection episode (HR 1.36; 95% CI: 2.31–80.22 (p=0.004)) as a significant contributing factor for graft failure.

Conclusions: At 5 years there was no significant difference in graft survival or endothelial cell loss between DMEK and DSEK eyes with FED. We propose that our standardised technique reduces the need for rebubbling. DMEK had superior visual acuity outcomes compared with DSEK in these patients up to 5 years after surgery.

P4 Utilising endothelial migration to perform deep anterior lamellar keratoplasty in eyes with deep posterior corneal scarring typically treated with penetrating keratoplasty

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Purpose: To describe a novel technique for deep anterior lamellar keratoplasty (DALK) in patients central corneal perforation and deep scarring making conventional DALK (Melles or Big Bubble) unviable. A posterior Descemet's membrane (DM) skirt has provided an adequate scaffold for the migration of the host endothelial cells.

Methods and analysis: A case report. A 32-year-old male with previous hydrops developed severe corneal scarring with a break in DM visible on OCT scanning. A modified DALK procedure was perform consisting of a 400µm, 8.5mm Anterior lamellar cap with a 4.5mm posterior lamellar disc, denuded of endothelial cells and containing a DM skirt.

Initially, manual dissection of the and anterior 400µm of corneal stroma was performed using a modified Melles technique. The residual posterior lamellar was assessed and found to have significant residual scarring. A central 4mm optical window was performed through the posterior lamellar over the visual axis.

The donor tissue was cut using a 350µm microkeratome head. The anterior cap was trephined to 8.5mm and set aside. The posterior lamellar was placed in a punch block, and the endothelial was removed using a silicone tipped cannula. The removal of endothelial cells was confirmed using trypan blue dye. A posterior lamellar graft with a 4.0mm stromal bed and a 4.5mm DM skirt was fashion using a peeling and double punch technique. The posterior lamellar graft was inserted into the optical window such that the DM skirt provided a bridge to the donor corneal endothelium. The anterior cap was sutured with a double continuous suture of 10-0 monofilament nylon. An inferior peripheral iridotomy was created, and an air bubble filling the anterior chamber was left at the end of the case.

Results: The preoperative visual acuity (VA) was hand movements. Full attachment of the posterior lamellar was seen at all time-points from week one onwards. Central corneal pachymetry continued to reduce for 12 weeks. One year after the operation, with sutures in, the best spectacle-corrected VA was 6/12.

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Continued: The corneal graft was clear, and no rejection episodes occurred. Endothelial cell repopulation of the donor DM could be observed with specular microscopy.

Conclusion: The presence of DM promotes endothelial migration and healing. Modifications to traditional DALK surgery, in which DM is used to promote endothelial healing, are a viable alternative to penetrating keratoplasty. This method eliminates the risk of allograft endothelial rejection and allows a "regenerative" for DALK to be used, offering a new modality of treatment in patients with healthy reserves of endothelial cells and deep posterior lamellar scarring.

P5 Predicting ablation spherical equivalent of prior LASIK treatment from corneal pachymetry map

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Purpose: To provide a metric to differentiate between hyperopic and myopic ablation of a prior LASIK treatment based on the corneal pachymetry profile after laser vision correction.

Methods: Pachymetry data were recovered retrospectively from patients who had previous LASIK for refractive purposes between 2019 and 2020. Patients with any corneal disorder were excluded. Ablation spherical equivalent was predicted from central to semi-peripheral corneal thickness (CPT) ratio, both for values provided by Pentacam, and values computed from extracted raw pachymetry data.

Results: Data were analysed for 140 eyes of 73 patients (42% female, mean age 40.9, SD 12.8). CPT-ratio cut-off for distinction between myopic and hyperopic LASIK was 0.86 for pentacam-provided values. Sensitivity and specificity were 0.7 and 0.95, respectively. Accuracy increased with computation of CPT ratio based on extracted raw data. Sensitivity and specificity were 0.87 and 0.99, respectively. There was a marked linear correlation between CPT-ratio and ablation spherical equivalent (R2=0.93).

Conclusions: CPT ratio cut-offs can correctly classify hyperopic versus myopic spherical equivalent of previous LASIK ablation. This could prove useful for increased accuracy of intraocular lens (IOL) calculations for patients with no historical data of their prior LASIK surgery at the time of cataract surgery planning.

P6 Cornea guttata in transplanted donor tissue, is there a need of improvement in the eye bank screening?

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Purpose: We describe 2 cases who underwent uneventful DMEK surgery but presented delayed recovery and had confirmed cornea guttata in the donor tissues. Both patients received a cornea from the same donor.

Cases: A 78-year-old man with Fuchs' dystrophy underwent triple procedure (phaco +IOL + DMEK) in his right eye and presented persistent central corneal oedema despite fully attached graft. Early rejection was suspected, and the oedema took 6 weeks to resolve completely at which point we confirmed central guttata in the donor tissue. His contralateral eye underwent DMEK surgery six months before and had clear cornea with no guttata. A 74-year-old man with corneal scarring and aphakic bullous keratopathy underwent DMEK surgery and had a persistent corneal oedema postoperatively even after initial rebubbling for a partially peripherally detached graft. Corneal oedema persisted for two months postoperatively despite full attachment and guttata identified. Both donor corneas were reported to have endothelial cell counts of 2600 cells/mm^2 preoperatively. In both cases confocal microscopy confirmed the presence of guttata in the donor graft. An imaging assessment from the donor tissues was performed with the eye bank and review from the literature is discussed.

Conclusion: Fuchs' dystrophy appears relatively common in the general population (4% in the USA); thus a proportion of this condition might be expected in donor corneas. Identification of guttae in donor corneas with early stages of Fuchs' dystrophy appears challenging. Current modalities of graft material screening (which appears to be standardised across Europe) are more orientated toward measuring the endothelial cell density and morphology and less toward detection of guttae. However, we believe this challenging case may not be isolated and thus improvement of eye bank screening would be of critical value to detect early Fuchs' dystrophy in donor tissues and therefore improve graft survival.

P7 Impact of fluoroquinolones and aminoglycosides on P. *aeruginosa* virulence factor production and cytotoxicity

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Introduction: *Pseudomonas aeruginosa* injects toxins, ExoS or ExoU, into host cells via the type III secretion system (T3SS) which destroy cells and help evade the immune system. First-line fluoroquinolones demonstrate better in vitro activity against *P. aeruginosa* but in certain clinical situations aminoglycosides are more effective. We evaluate the effects of fluoroquinolones (moxifloxacin and ciprofloxacin) and aminoglycosides (tobramycin and gentamycin) on T3SS and toxin expression, and the associated toxicity in corneal epithelial cell infection models.

Methods: Expression levels of pcrV (T3SS needle component) from ExoU-expressing PA103 and ExoS-expressing PA76026 after 16h incubation in each antimicrobial was detected using western blotting. qRT PCR detected mRNA levels of ExoU, ExoS, pcrV and ExsA (T3SS activating factor) after PA103 and PA76026 were exposed to tobramycin and moxifloxacin. LIVE/DEAD and LDH assays after 24h evaluated how the antimicrobials influenced acute cytotoxicity in a HCE-T cell scratch and infection model.

Results: Tobramycin significantly reduced pcrV in both strains by 50.5-74.0% compared to the fluoroquinolones ($p=0.001$ and 0.003), even at low concentrations. Fluoroquinolones significantly increased pcrV by 57.0-81.8% ($p=0.004$ and 0.003). mRNA levels of ExoU, ExoS, pcrV and ExsA were reduced by tobramycin but moxifloxacin increased pcrV, ExsA and ExoS. Tobramycin, despite more bacterial expansion compared to the same relative concentrations of fluoroquinolones, reduced ExoU/ExoS cytotoxicity and allowed complete wound healing.

Discussion: Tobramycin downregulates T3SS expression and reduces ExoS /ExoU mediated cytotoxicity which protects infected HCE-T cells even at low concentrations. Fluoroquinolones however upregulated T3SS and do not negate the cytotoxic effects.

P8 Transepithelial PTK / limited non topoigraphic PRK combined with corneal crosslinking for keratoconus

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Objective: To evaluate the outcomes of combined excimer laser PTK / limited PRK combined with corneal crosslinking in the management of keratoconus.

Methods and analysis: Data were analysed from a retrospective cohort of eyes undergoing PTK epithelial removal or limited PRK combined with corneal crosslinking. Patients undergoing PRK were either contact lens intolerant or were considering alternate surgical therapy including corneal transplantation. Data included uncorrected and best corrected vision, refraction and OCT topographic findings. Treatments were performed using a TECHNOLAS® TENEO™ 2 (Bausch & Lomb) and CXL with Avedro KXL (Glaukos) according to a modified protocol.

Results: 24 eyes were treated using combined Excimer laser PTK or limited non-topographic transepithelial PRK depending on intervention protocol with >3 month follow-up. Postoperative best corrected visual acuity improved by a mean of 0.42 LOGMAR units (SD 0.37, range 0.1 to 1.4) ($p<0.005$). All eyes had improvement of BCVA. Mean absolute spherical refractive error decreased by 0.56 D (SD 1.26, range -2.5 to 2) ($p<0.05$). Postoperative spherical error increased in a few cases (3/24, 12%) Mean absolute refractive cylinder decreased by 1.46D (SD 2.3 range -4.75 to 7) ($p<0.05$). Limited increase of astigmatism occurred in 2 (8,3%) cases. There were no postoperative complications noted.

Conclusion: PTK /limited non topographic PRK combined with CXL may offer improvement to corrected visual acuity compared to CXL alone.

P9 Galilei topography vs Anterion topography. Same patient, different results?

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Objective: Corneal topography is a crucial part of the decision making process in clinics throughout the country. numerous machines are available, therefore it is important if a patient has topography performed on one device it produces consistent results on another device. Our service is somewhat unique with eye clinics running on two different sites with two different topography machines. This study aims to compare the commonly used Galilei machine with the newer Anterion machine to see if the measurements are comparable.

Methods and analysis: We identified 20 patients (between the ages of 15 and 40) with a diagnosis of keratoconus who had undergone both Galilei and Anterion topography. Only those patients who had undergone both scans within a 2-week time frame (and should therefore have very similar topography readings) were included. We compared Flat Sim K, Steep Sim K, K Max and Pachymetry readings between the two devices.

Results: The mean difference in Flat Sim K was 0.41. The largest difference was 1.1. The mean difference in Steep Sim K was 0.52. The largest difference 1.8. The mean difference in K Max was 0.73. The largest difference 2.1. The mean difference in pachymetry was 11µm. The largest difference 21µm.

Conclusion: There was considerable differences in measurements between the two devices, with K Max and Pachymetry showing the most disparity. We therefore recommend caution when deciding upon, for example keratoconus progression, in a patient who has undergone topography on two different devices.

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