

Oral abstract presentation

OP-1 ANALYSIS AND REPORTING OF SURGICALLY INDUCED KERATOMETRIC EFFECT (SIKE)

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Purpose To investigate the surgically induced keratometric effect (SIKE) associated with cataract surgery.

Methods Consecutive patients undergoing cataract operation by four surgeons were prospectively included. Two surgeons made an incision at 110 with one side port at 50 (location 1). Two surgeons made a temporal incision at 200 and 20 for right eyes and left eyes respectively, with two side ports (location 2). Biometry was acquired preoperatively and at 6-weeks postoperatively using an IOL Master 500 (Carl Zeiss Meditec, Jena, Germany) on the operated and unoperated fellow eye. Keratometric change was analysed after being transformed into Long's formalism. Coupling was defined as a change between the mean pre to post K that was less than the change in the unoperated eye.

Results Two hundred patients were included, (132 in location 1 and 68 in location 2). There were significant differences in pre- to postoperative keratometry: location 1: preoperative and postoperative mean K were 43.65 (95%CI:40.27 to 47.04), 43.64 (95%CI:40.20 to 47.09) respectively, mean absolute difference 0.19 (SD:0.19;p<0.01), location 2: preoperative and postoperative mean K were 43.29 (95%CI:39.89 to 46.70), 43.21 (95%CI:39.91 to 46.51) respectively, mean absolute difference 0.21 (SD:0.21;p<0.01). For location 1, the mean SIKE was -0.23 @ 111/+0.21 @ 21 (95%CI:-1.43@122/+0.04 @ 32 to +1.04 @ 135/+0.30 @ 45). For location 2, the mean SIKE was -0.29 @ 104/+0.13 @ 14 (95%CI:-1.75@122/-0.19 @ 32 to +0.30 @ 47/+1.32 @ 137). Keratometric changes were not coupled in 69/132 (52%) for location 1 and in 42/68 (62%) for location 2, no significant difference between the coupling rate of location 1 and location 2 (p=0.51).

Conclusion The SIKE is relatively predictable for incision location and was surgeon independent. Coupling occurs in less than 50% of cases with a change in the mean keratometry.

OP-2 ASSESSMENT OF CORNEAL ANGIOGRAPHY FILLING PATTERNS IN CORNEAL NEOVASCULARIZATION

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Purpose To describe vascular filling patterns in corneal neovascularization (CoNV) and evaluate the effect of corneal lesion location, CoNV surface area and multi-quadrant CoNV involvement on the filling pattern.

Methods Retrospective study of patients who had been investigated for CoNV using fluorescein angiography (FA) or

indocyanine green angiography (ICGA) between January 2010 and July 2020. Angiography images were graded and analysed multiple independent corneal specialists. Corneal surface was divided into 4 quadrants and patient information was obtained through electronic records.

Results 133 eyes were analysed. Corneal lesions were located on the peripheral (72%) or central (28%) cornea. Central lesions were associated with multi-quadrant CoNV more frequently than peripheral lesions (p=0.15). CoNV located within the same quadrant of the corneal lesion was often first to fill (88.4%). In multi-quadrant CoNV, the physiological inferior-superior-nasal-temporal order of filling was usually respected (61.7%). Central lesions resulted in larger CoNV surface area than to peripheral lesions (p=0.09). In multi-quadrant CoNV, the largest area of neovascularization was also the first to fill in (peripheral lesion 74%, central lesion 65%).

Conclusion Fillings patterns in healthy corneas have previously been reported. Despite CoNV development, these patterns are usually respected. Several factors that may influence filling patterns have been identified, including corneal lesion location, CoNV surface area and aetiology of CoNV. Understanding filling patterns of neovascularization allows identification of areas at higher risk of developing CoNV, aiding in earlier detection and intervention of CoNV.

OP-3 THE EFFECTIVENESS OF ARTIFICIAL INTELLIGENCE IN ANNOTATING AND MEASURING CORNEAL PATHOLOGY ON OCT

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Objective To determine if corneal OCT images can be characterised and measured using artificial intelligence (AI) and how this compares to manual subjective assessment.

Methods Phase one. Casia OCT images of patients with corneal disease were included from Birmingham and Liverpool. Individual images were annotated by expert clinicians after concordance training sessions. Two annotations were made: high and low confidence lesion borders. Images were split into training and testing sets. Training data were used to train a DeepLabV3 deep learning model. Testing sets were used to evaluate performance. Lesions were independently evaluated by three masked experts. Phase two. OCT images from patients with microbial keratitis (MK) on days 0, 3, 7 and 28 were annotated by AI after training on normal corneal OCTs. Nonparametric analysis was undertaken using SPSS v25.

Results Phase one. 456 images from patients with primary cornea disease were used to train the AI model and 43 were used for testing the model. Comparing manual and automated annotation, there was a significant difference between expert clinicians (p=0.03, p=0.001) in deciding whether the AI or subjective annotation was a better representation. This may reflect the variety of lesions included. Phase two. Images of 102 patients with MK were selected from days 0, 3, 7 and 28 and subjected to automated annotation. Data analysis on AI annotation of improvement in MK is due March 2022.