

Assessment of Changes in Epithelial Thickness after DSAEK or DMEK.

Sarah Abdalrahman¹, Alison Maddigan², Jamie Bhamra^{1,2,3}

¹Cumming School of Medicine, University of Calgary, ²Vector Eye Center, Calgary, ³Division of Ophthalmology, Department of Surgery, University of Calgary



Background

Descemet stripping automated endothelial keratoplasty (UT-DSAEK) and Descemet Membrane Endothelial Keratoplasty (DMEK) are common surgical treatment options for endothelial failure, most commonly Fuch's Endothelial dystrophy and pseudophakic bullous keratopathy (PBK).¹

Changes in epithelial thickness after DSAEK or DMEK could impact vision and refraction.² This is of interest especially if a combined surgery is being done, as these post-operative changes could impact intended post-op refraction targets and quality of vision if not accounted for prior to surgery.

Previous literature presents varying results, with no changes in epithelial thickness up to three months post-operatively¹, while others found a decrease in epithelial thickness³. This study aims to investigate these changes further.

Purpose

We aim to investigate how epithelial thickness changes in patients with Fuch's endothelial dystrophy or pseudophakic bullous keratopathy, after DSAEK or DMEK.

Methods

Retrospective, chart review was carried out for patients who had undergone DSAEK or DMEK for Fuch's dystrophy or PBK.

Patient baseline characteristics and central epithelial thickness measurements performed by Zeiss Cirrus HD AS-OCT were recorded before surgery and post-operatively at 2 weeks, 1 month, and 3 months.

Mean epithelial thickness measurements of a 7-mm diameter area were subdivided into 3 concentric radial zones (0 to 2 mm, 2 to 5 mm, 5 to 7 mm).

Analysis:

- Repeated measures one-way ANOVA and Tukey post hoc testing comparing each post-operative time point to the pre-operative measurement for each concentric radial zone.

Results

Table 1. Sample characteristics at baseline

Number of eyes	50
Number of patients	42
Age (years), mean +/- SD	73.4 +/- 11.1
Female (%)	38 % (19/50)
DSAEK %	84 % (42/50)
DMEK %	16 % (8/50)
Percentage of patients with only Fuch's dystrophy	40 % (20/50)
Percentage of patients with only PBK	48% (24/50)
Percentage of patients with Fuch's dystrophy and PBK	12 % (6/50)
0.0 - 2.0mm Pre-Op Epithelial thickness (µm) +/- SD	50.1 +/- 10.8
2.0 - 5.0mm Pre-Op Epithelial thickness (µm) +/- SD	48.2 +/- 9.25
5.0 - 7.0mm Pre-Op Epithelial thickness (µm) +/- SD	46.4 +/- 7.73

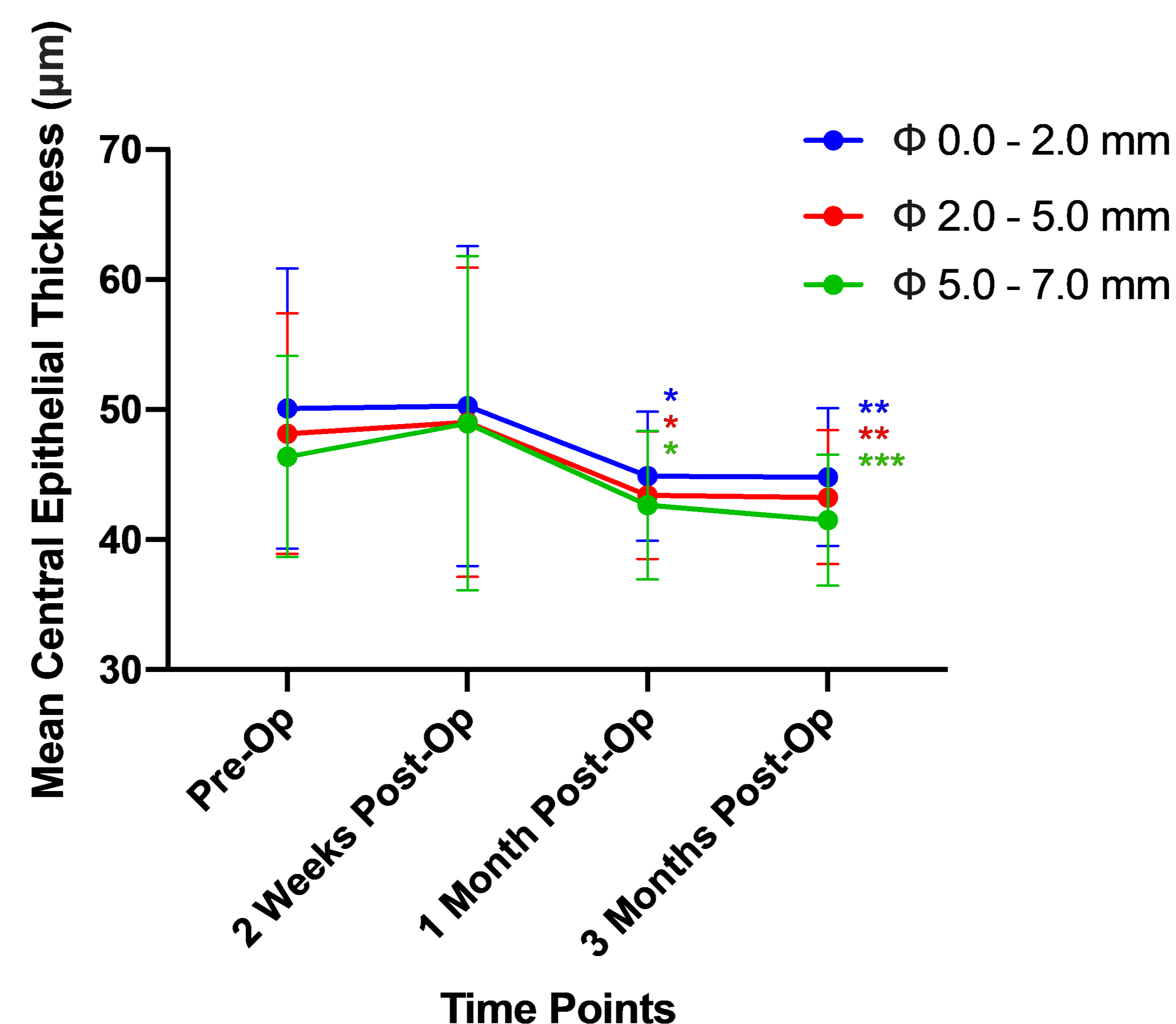


Figure 1. Epithelial thickness in different concentric zones over time. * = P < 0.05, ** = P < 0.005, *** = P < 0.0005. Thickness decreased from pre-operative levels at the one month and three months post-operative time points.

Epithelial thickness decreased in all concentric radial zones 1 month post-operatively and 3 months post-operatively. There were no significant changes in epithelial thickness two weeks post-operatively.

Table 2. Mean difference in central epithelial thickness measurements between pre-operative and each post-operative measurement for each concentric zone.

Comparison Pair	Mean Diff. (µm)	95.00% CI of diff.	Adjusted P Value
0.0 – 2.0mm Pre-Op vs 2 Weeks Post-Op	-0.191	-5.19 to 4.81	>0.9999
0.0 – 2.0mm Pre-Op vs 1 Month Post-Op	5.19	0.190 to 10.2	0.0373
0.0 – 2.0mm Pre-Op vs 3 Month Post-Op	5.26	0.911 to 9.61	0.0090
2.0- 5.0mm Pre-Op vs 2 Weeks Post-Op	-0.861	-5.67 to 3.94	0.9998
2.0- 5.0mm Pre-Op vs 1 Month Post-Op	4.74	0.708 to 8.77	0.0122
2.0- 5.0mm Pre-Op vs 3 Month Post-Op	4.90	1.24 to 8.56	0.0028
5.0- 7.0mm Pre-Op vs 2 Weeks Post-Op	-2.56	-7.29 to 2.17	0.6948
5.0- 7.0mm Pre-Op vs 1 Month Post-Op	3.73	0.422 to 7.05	0.0183
5.0- 7.0mm Pre-Op vs 3 Month Post-Op	4.88	1.72 to 8.04	0.0004

Discussion and Conclusion

Overall, our study found that central epithelial thickness remains stable until 1 month post-operatively, where it decreases and continues to be decreased 3 months post-operatively.

- This aligns with prior work that revealed a decrease in epithelial thickness after DSAEK³. This study adds to our understanding of post-operative DMEK epithelial changes. Presumably, post-operative refractive results, after DSAEK and DMEK, due to the cornea epithelium's optical power likely do not stabilize until 3 months.
- Preoperative epithelial thickness values above 65 µm, deserve further evaluation with IOL calculations, in combined cases, to accurate post-operative refractive targeting. Broadly speaking, an increase or decrease in 10 µm of corneal epithelial thickness may result in a 1 D change in dioptric power⁴.

Limitations: Limited follow up range, small sample size

Future directions: Comparing epithelial thickness changes between DMEK vs DSAEK, between different indications for surgery, changes in refractive power correlating with epithelial changes, longer follow up ranges

References

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