

Descemet Membrane Endothelial Keratoplasty: Enhanced Results With a Standardized Technique

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Introduction

PLK, DLEK, DSEK, DSAEK, DMEK, DMAEK. Endothelial keratoplasty is a rapidly evolving procedure. Each successive iteration has delivered enhanced results but has only become widespread with introduction of attainable techniques with low complication rates. This study reports results of a simplified and standardized DMEK technique at one center by multiple surgeons to deliver improved results with a low rate of complications. This technique makes use of techniques developed at our institution as well as those shared by many other surgeons and features pre-stripped tissue, SF6 gas, a closed system glass injector, and avoidance of graft overlap with the host Descemet membrane.

Methods

We retrospectively reviewed charts and identified patients with Fuchs dystrophy who underwent DMEK alone or DMEK with cataract surgery. We excluded cases of PBK and excluded complex cases such as those with prior PK, prior glaucoma surgery, or prior vitrectomy. We also excluded patients who were underwent DMEK prior to establishment of our standardized technique. This yielded a consecutive series of 101 DMEK surgeries to review for postoperative complications and endothelial cell loss. A similar group of patients was identified at the University of Iowa and their data on 78 eyes was kindly shared with us.

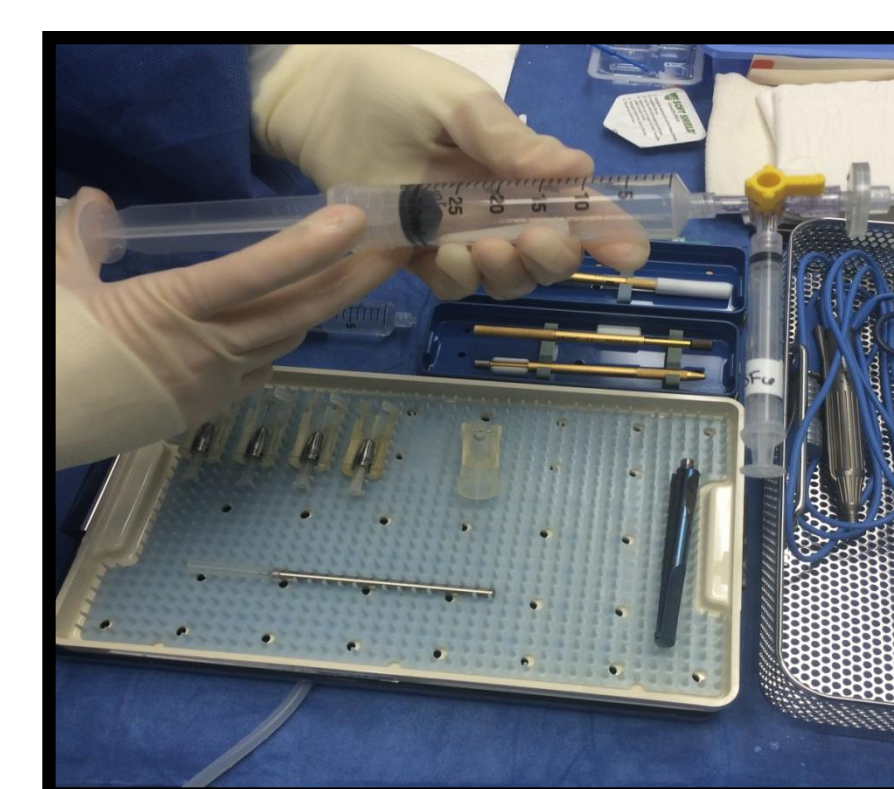


Devers Eye Institute Standard DMEK Technique, Key Points:

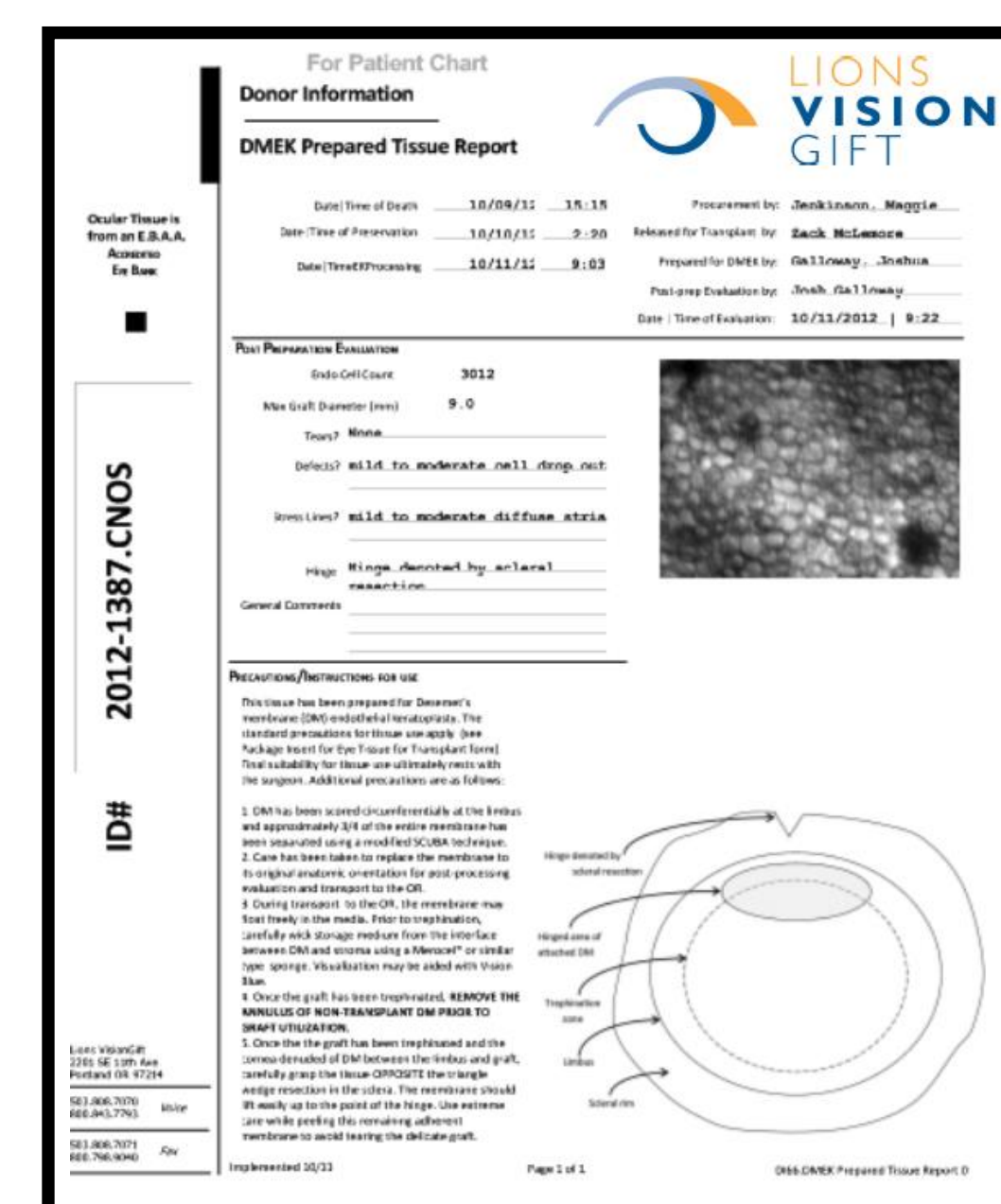
- Pre-stripped eye bank prepared tissue
- **S - Stamped** tissue for correct graft orientation
- **Modified Straiko Jones tube** for graft injection
- **No touch "tap technique"** for graft unfolding
- **20% SF6 gas** for prolonged graft support
- **Avoidance of DM graft overlap with host DM**



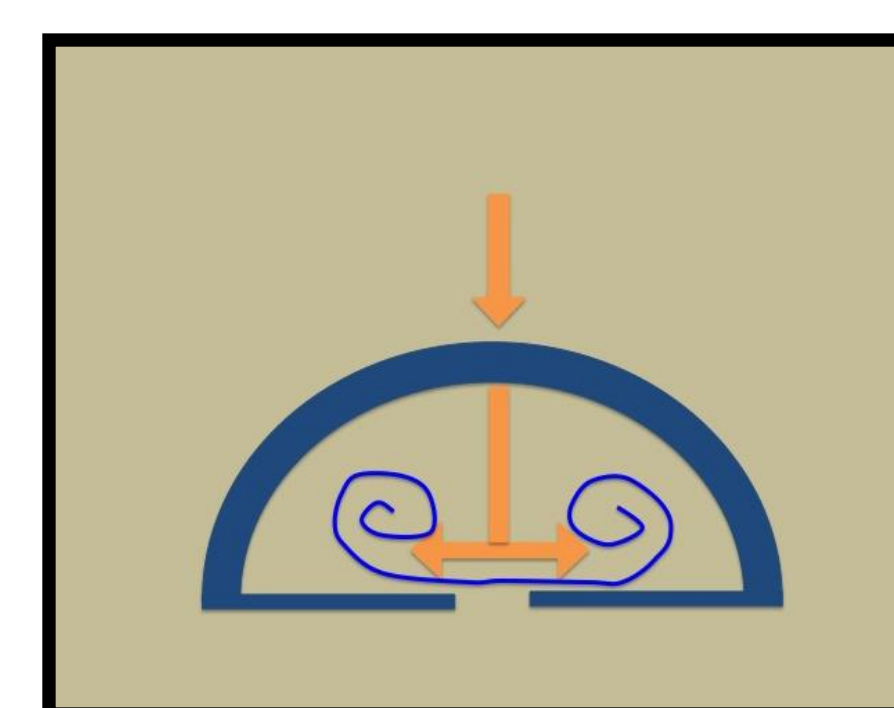
Jones Tube for DMEK



SF6 Gas



Pre stripped tissue



No touch tap technique. External force on the cornea creates fluid movements that are used to unscroll and position the graft without directly contacting it.

Multicenter Technique with the Standard Technique

	n	Re-bubbles	Primary Graft Failure
Devers	101	7 (7%)	*3 (3%)
Iowa	78	**5 (6%)	5 (6%)

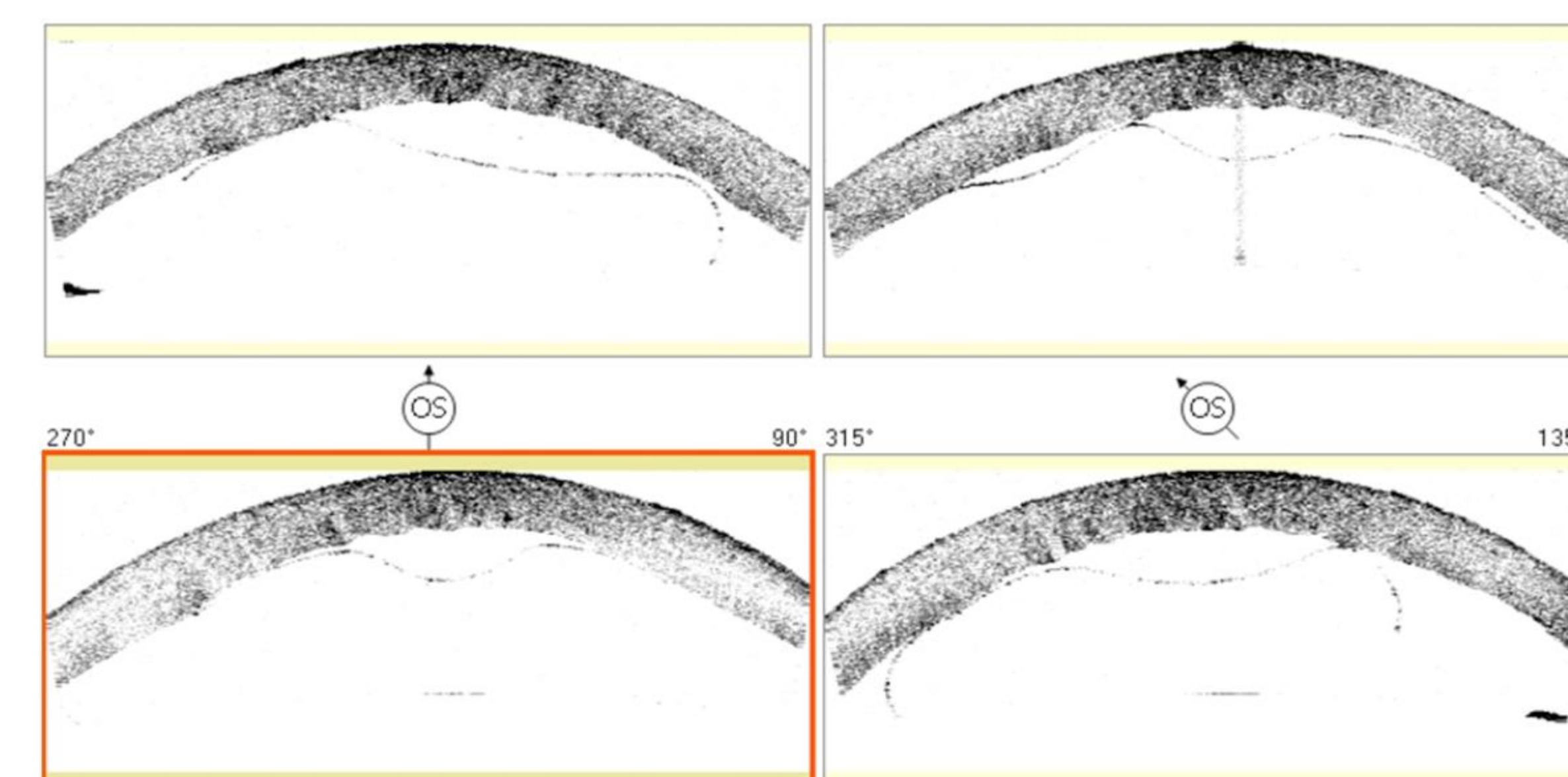
* PGFs: All three from upside down grafts
 ** Re-Bubble: Two cases where the host bed was under-stripped

Videos of standardized technique at Devers:



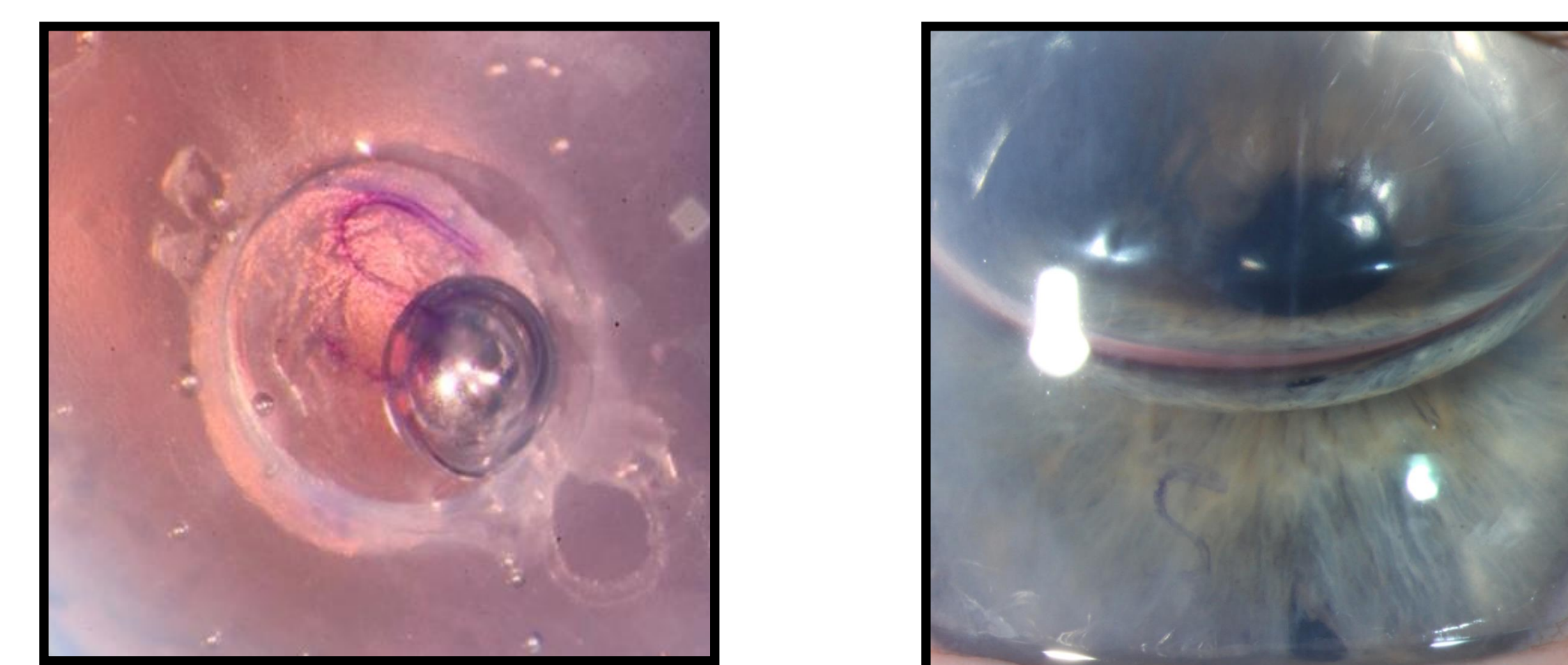
- A) DMEK with cataract surgery: A Standardized Technique
- B) DMEK Corneal transplant using a no-touch "tap-technique"
- C) DMEK Tips and Tricks

Upside-Down Grafts



Above: OCT images of a DMEK graft which was inadvertently placed upside-down. Note the direction of the curling of the graft at the peripheral edges indicating upside down orientation.

Pre stripped S-stamped DMEK Tissue has Eliminated Upside-Down Grafts



Eye bank prepared S Stamped DMEK tissue prior to graft insertion (left) and in the eye on post operative day 1 (right).

Results

At Devers, Seven cases received an air bubble injection postoperatively for graft separation (7%). There were 3 primary graft failures (PGF); all were upside-down grafts (3%) and were prior to introduction of the S stamp. The 6-month endothelial cell loss was 28% (n = 70). There were no cases of pupillary block. Addition of the S stamp has eliminated upside-down grafts and eliminated PGF in our 131 most recent cases.

Conclusion

The use of this standardized technique at our institutions has resulted in low complication rates and acceptable cell density. Addition of the S stamp has improved our results at Devers by eliminating our main cause of PGF.

We believe DMEK is ready for mass adoption for treatment of Fuchs endothelial dystrophy. The key steps of our reproducible technique are ready for adoption at other centers to achieve similar results.

Key References

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