

ENDOILLUMINATOR ASSISTED DMEK (E-DMEK)/ ENDOILLUMINATOR ASSISTED PDEK (E-PDEK)

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Descemet's membrane endothelial keratoplasty (DMEK) was first described by Gerrit Melles in 2006. and transplants the donor Descemet's membrane with endothelium unlike Descemet's Stripping Automated Endothelial Keratoplasty (DSAEK) which also includes donor stroma. DMEK has major advantages over DSAEK in providing better vision, not inducing hyperopia as well as being associated with very low rates of graft rejection. However, DMEK has a steep learning curve associated with it. The DMEK graft is thin, flimsy and difficult to handle with ease in the anterior chamber. Pre-Descemet's Endothelial Keratoplasty (PDEK) differs from DMEK in also transplanting the Pre-Descemet's layer or the Dua's layer in addition to the Descemet's membrane and endothelium. The more resilient Dua's layer makes the PDEK graft more easy to handle and less liable to tears than the DMEK graft. However, with both the DMEK and the PDEK grafts, it is vital to correctly identify the Dua/Descemet side of the graft in order to orient the graft with the Dua/Descemet's side up. Since the Descemet's membrane is an elastic structure, the graft always curls towards the Descemet side. Therefore, a correctly oriented graft should have the edges curling upwards. Good visualization is essential for ensuring this.

Though Trypan blue staining of the graft can enhance visibility, dye wash-off occurs during surgery, especially with longer surgical times. Even with a well stained graft, vertical light from the operating microscope interferes with three-dimensional perception and can make side identification difficult. Vital information with regard to graft morphology, orientation and direction of curling is often difficult to decipher. A cannula may be passed into the anterior chamber to see if it lies below or above the blue stained graft, but this is a touch technique and can lead to shallowing of the anterior chamber and disturb an oriented graft. The hand held slit lamp gives a slit view, the entire graft cannot be viewed simultaneously and surgical manoeuvres cannot be done simultaneous with slit viewing. The entire scenario is worsened by corneal edema which often co-exists in such patients or increases with increasing duration of surgery.

A new technique that one of us (Soosan Jacob) has described for making DMEK easier is the **Endoilluminator assisted DMEK/ PDEK or E-DMEK/ E-PDEK** technique. An endoilluminator or light pipe used by the vitreo-retinal surgeons is used for this purpose. The DMEK/ PDEK graft is prepared and stained. Once the host cornea is prepared by scoring and stripping the Descemet's membrane, the DMEK graft is injected into the anterior chamber. The microscope light is switched off and the endoilluminator is held obliquely at the limbus to shine the light into the anterior chamber on to the DMEK graft. The tangential light from the endoilluminator allows good comprehension of the DMEK graft, its position, folds in the graft and orientation of Descemet's membrane versus endothelium with respect to overlying stroma etc. The entire graft morphology can be defined by changing the angle of incident light, by moving the probe around the limbus as well as by seeing movement induced in the graft by fluid currents/ gentle tapping. The obliquely incident light gives

striking three-dimensional depth perception secondary to reflexes. Graft orientation can be checked by seeing the reflexes bouncing off the edge of the graft on very gently tapping the cornea thus helping the surgeon to conclusively determine whether or not the graft is flipped. It has the advantage of maintaining a non-touch technique, thus decreasing cell loss in the graft.

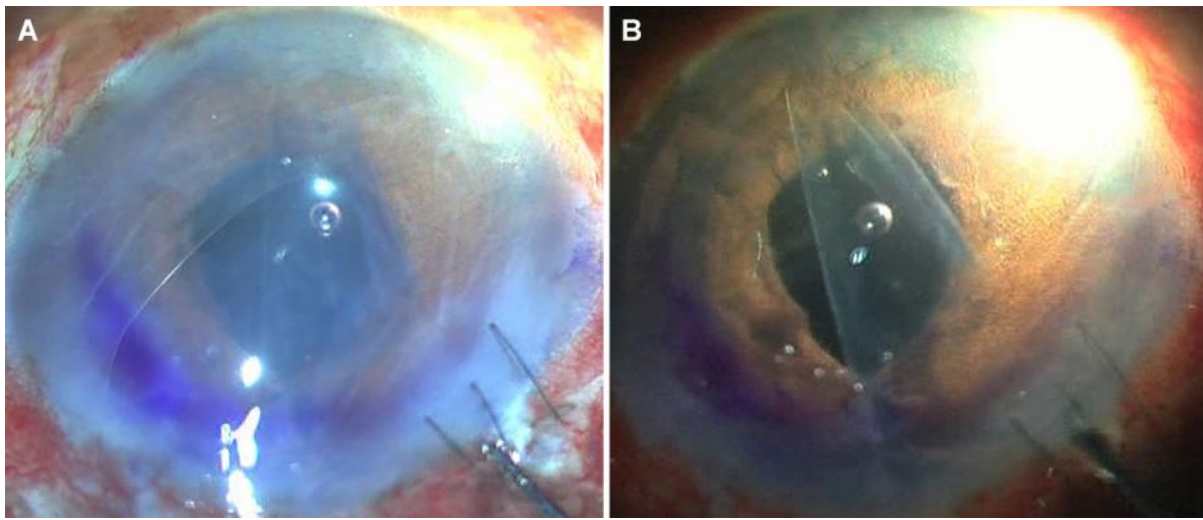


Fig 1: Poor visualization and absence of three dimensionality with vertically incident microscope light. B: E-PDEK shows vastly improved visualization and three dimensional depth perception. Gentle tapping allows easy identification of direction of curve of graft edges. Better surgeon comprehension leads to easier and faster surgery.

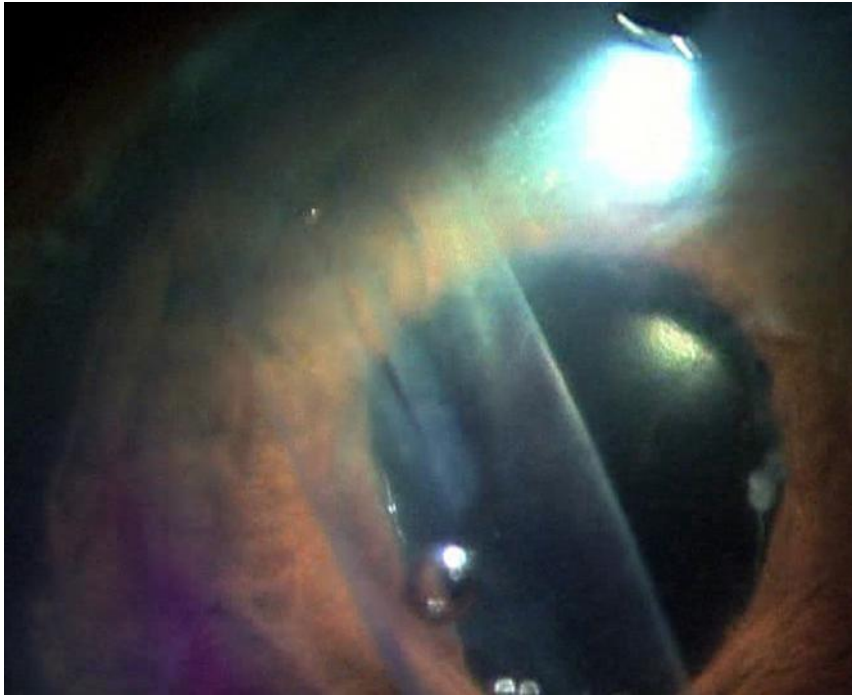


Fig 2: With E-DMEK, light reflexes created by obliquely incident light from endoilluminator provides excellent detail with regards to scrolling, folds and edges of graft as well as greatly enhanced three-dimensionality thus giving better comprehension of graft position, orientation and morphology.

E-DMEK/ E-PDEK techniques allow rapid, easy and successful surgery with good comprehension of the graft morphology and dynamics in an easy, non touch manner. The entire extent of the graft can be easily visualized three dimensionally. Graft dynamics are better comprehended leading to easier and faster surgery. Graft damage secondary to prolonged surgery, excessive fluidics and unnecessary manipulation is decreased. The technique is especially invaluable when visibility is already compromised secondary to corneal edema or dye wash-out. Surgery can be speeded up because of better visualization of the whole graft, thereby decreasing graft damage.

REFERENCE:

1. Jacob S, Agarwal A, Agarwal A et al. Endoilluminator assisted transcorneal illumination for Descemet's Membrane Endothelial Keratoplasty (E-DMEK) : a technique for enhanced intra-operative visualization of the graft in corneal decompensation secondary to pseudophakic bullous keratopathy. JCRS (in press)

VIDEO LINK FOR SURGERY:

Videos available in Youtube channel: Dr. Soosan Jacob

<http://www.youtube.com/watch?v=K3SmgJ2exWY>