

Pre-Descemet's endothelial keratoplasty - PDEK

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INTRODUCTION

Pre-Descemet's endothelial keratoplasty (PDEK) is the latest iteration in the arena of endothelial keratoplasty procedures. It encompasses the involvement of pre-Descemet's layer (PDL-Dua layer) along with the Descemet's membrane (DM) endothelial complex in the donor graft lenticule. The addition of PDL to the donor graft facilitates better and smooth unrolling of the graft in the recipient eye as compared to the Descemet's membrane endothelial keratoplasty (DMEK) graft.

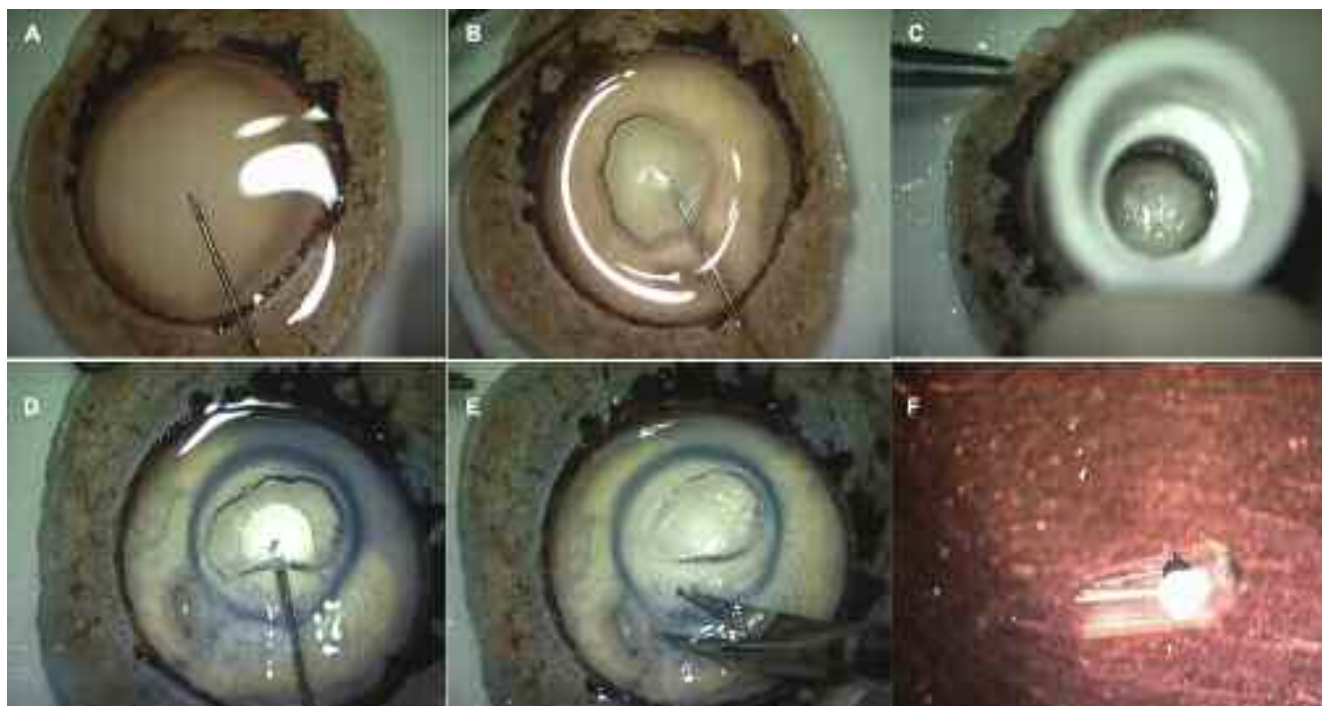
DONOR GRAFT PREPARATION

A 30 gauge air filled syringe is introduced with bevel down position from the corneo scleral rim up to the centre (Fig 1 A) of the donor tissue and air is injected (Fig 1B). This creates Type 1 bubble which spreads from centre to periphery between the corneal stroma and the PDL-DM-Endothelial complex. Trephination is done (Fig 1C) followed by injection of Trypan Blue in to the bubble (Fig 1 D). The graft is cut with a corneo-scleral scissors around the margins of the air bubble (Fig 1 E) and is kept in the storage media (Fig 1 F).

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A: 30 gauge needle attached to 2 ml air filled syringe is introduced with a bevel up from the corneo scleral junction of the donor tissue. B: Air is injected and Type-1 bubble is formed between the Pre-Descemet's Layer-DM-endothelial complex and the corneal stroma. C: Trephination done. D: Trypan blue is injected inside the air bubble for easy visualisation of the tissue complex. E: The donor tissue is cut with a corneo scleral scissor all around the margins of the air bubble. F: Donor tissue placed in the storage media.

DONOR GRAFT INSERTION

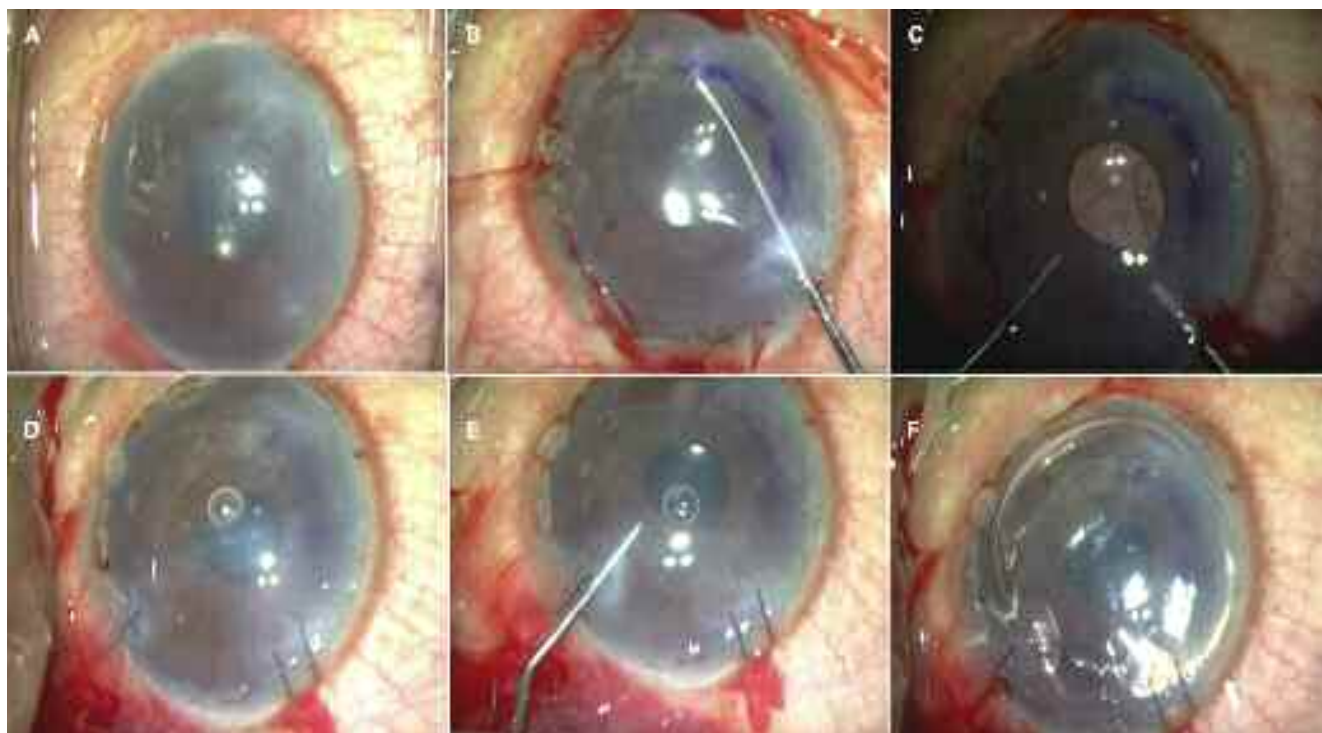
After administering peribulbar anesthesia a trephine mark is made on the recipient cornea (Fig 2 A) respective to the diameter of DM to be scored on the endothelial side. A 2.8 mm corneal tunnel incision is made and the anterior chamber (AC) is formed and maintained with saline injection or infusion. Descemetorhexis is performed from the endothelial side with a reverse Sinskey hook (Fig 2 B). Once an adequate edge is lifted, a non-toothed forceps is used to gently grab the DM which is peeled and is removed from the eye (Fig 2C).

The graft is loaded in to an injector of foldable IOL when ready for insertion. The spring of the injector is removed to prevent any back suction and inadvertent damage to the donor graft. The donor graft is injected in a controlled fashion into the AC (Fig 2D) and is positioned on to the recipient posterior stroma by careful, indirect manipulation of the tissue with air and fluid (Fig 2 E). Once the lenticule is unrolled, an air bubble is injected underneath the donor graft lenticule to lift it towards the recipient posterior stroma (Fig 2 F).

DISCUSSION

DMEK poses challenges like difficulty in manual preparation of the donor tissue, undue rolling of the graft and subsequent difficulty in unrolling the graft when placed in the recipient eye attributed to the elasticity of especially young donor tissue. Because of the increased fragility of the tissue, there is an inherent risk of complication with DMEK that is greater than that with Descemet's stripping automated endothelial keratoplasty (DSAEK). DSEK, DSAEK or ultra thin (UT)-DSEK procedure entails the inclusion of corneal stroma in the donor graft thereby potentially limiting the speed of visual recovery; although the stability of the graft is achieved in the recipient eye. Descemet's membrane automated endothelial keratoplasty (DMAEK) is the procedure to overcome the difficulty with the surgical step of tissue unrolling and placement without the challenges of tissue unscrolling and centration found with DMEK.

The graft size achieved in PDEK is usually about 8-8.5 mm which is smaller in size as compared to other techniques. Therefore fewer endothelial cells are transplanted. But, PDEK allows the use of younger donor eyes and hence



*A: Pseudophakic bullous keratopathy.
 B: Descemetorhexis being performed.
 C: Recipient DM - endothelial complex removed.
 D: Donor graft injected inside the eye.
 E: Donor graft unrolled. Air being injected beneath the graft.
 F: Anterior chamber filled with air.*

thereby enables the higher cell counts associated with younger donors to be exploited to the patient's advantage. To aid in graft attachment the air fill of the anterior chamber at the end of the surgery is extended. This helps to pressurize the eye at the end of the surgery and also helps to appose the donor tissue to the recipient posterior stroma.

PDEK entails the inclusion of the PDL in the donor graft; thereby providing the benefits of DMEK like speedy visual recovery and overcoming the disadvantages posed by DMEK. PDEK takes UT-DSEK to a "thinner level" whilst

retaining its advantages but not requiring sophisticated instrumentation like an automated keratome. Moreover, the pre-PDL bubble can easily be created in young eyes (less than 50 year's age). These eyes with a relatively higher count of endothelial cells can therefore be used successfully for endothelial transplantation which should be a distinct advantage.