

Pre-Descemet's endothelial keratoplasty

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Endothelial keratoplasty (EK) has supplanted the penetrating keratoplasty procedure for corneal endothelial disorders. A review of literature on pre-descemet's EK, that is, a latest iterant in EK is described along with our experiences.

Key words: Descemet's membrane endothelial keratoplasty, double-infusion cannula technique, endothelial keratoplasty, glued intraocular lens, infant donor, pre-Descemet's endothelial keratoplasty, scarred cornea, trocar anterior chamber maintainer, young donor

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Endothelial keratoplasty (EK) was first reported by Tillett,^[1] and since then, EK has undergone evolution that has revolutionized the management of corneal endotheliopathies and has evolved into a popular alternative to penetrating keratoplasty (PK), thereby allowing a closed chamber approach and negating all the aspects of an open-sky surgery. EK allows replacement of dysfunctional host endothelium along with Descemet's membrane (DM) with or without the involvement of stromal tissue in the donor graft.

The initial technique involved suturing of the donor graft to the recipient bed that often led to complications such as displacement and decentration of the graft due to the pull created by the sutures^[2] until Melles *et al.* came with an idea of doing away with sutures and instead suggested putting an air bubble (bb) in the anterior chamber (AC) that pushed the donor graft close to the recipient bed. Melles *et al.* initially introduced deep lamellar EK^[2] that adopted the dissection of stroma from the recipient eye followed by its replacement with the equal amount of stroma from the donor's eye along with the DM-endothelium complex. But as it was technically challenging and also due to limitations of unpredictable outcomes, this technique was not widely accepted. Following this, Melles *et al.* introduced a technique that would completely do away with the need of recipient stromal dissection and involved only stripping the dysfunctional recipient DM-endothelium complex although the stromal tissue was still a part of donor tissue.^[3] This technique was known as Descemet's stripping EK (DSEK)^[4] and is currently the most popular EK procedure performed in the

US and worldwide.^[5] Mark Gorovy introduced the automated version of DSEK^[6] and it came to be known as Descemet's stripping automated EK (DSAEK).

Among the various iterations in EK, DSEK is widely accepted due to it being technically easier as compared to Descemet's membrane EK (DMEK) that involves isolation of the donor DM-endothelium complex exclusively. Inability to peel the DM-endothelium complex leads to tearing away of the lenticule and renders the donor tissue unusable for transplantation.^[7,8] To overcome this, automated versions have been introduced that involve a microkeratome^[9-11] and pneumatic dissection.^[12-14] Anwar and Teichmann^[15] described the procedure of separating Descemet's and endothelium from the overlying stroma by means of air injection and Busin *et al.*^[16] then adopted this for the same purpose in a donor tissue.

Dua *et al.*^[17] redefined the human corneal anatomy by identifying a novel pre-Descemet's layer (PDL) or a Dua's layer that was described to be approximately 10 µm in thickness and primarily comprised Type-1 collagen bundles. Although pneumatic dissection has been described before, Dua *et al.* distinctly described the Type-1, Type-2, and mixed bb, highlighting and scientifically proving their individual existence and significance.^[17] Pre-Descemet's EK (PDEK) is a newer variant in the arena of EK^[18] and it involves the separation of PDL along with DM-endothelium as a donor lenticule. The purpose of this paper is to review our

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experience with PDEK and its technicalities as a surgical procedure.

Technique

The procedure is performed under peribulbar anesthesia and supplemental anesthesia can be administered as necessary.

Donor Graft Preparation

The donor corneo-scleral button is placed with the endothelial side up, and a 30 G needle attached to an air-filled 5 mL syringe is introduced from the edge of the button to the mid-periphery of the graft [Fig. 1a and b]. Air is injected, and a central shiny, dome-shaped Type-1 bb [Fig. 1c] that characteristically spreads from center to periphery is formed that is around 8 mm in

diameter. The extreme periphery of the bb is punctured with side port blade [Fig. 1d] and trypan blue is injected to stain the graft [Fig. 1e]. The bb is then cut all around its extreme peripheral edge with a corneo-scleral scissors [Fig. 1f] and the graft is harvested.

Recipient Bed Preparation

Initially, epithelial debridement can be done in cases with massive corneal edema to enhance the intraoperative visualization of the surgical procedure [Fig. 2a]. The recipient bed preparation is essentially the same as in DMEK procedure. A trocar- AC maintainer (ACM)^[19] is introduced inside the eye and air is infused into the AC [Fig. 2b and c]. Descemetorhexis is performed under air with the reverse Sinsky's hook that scraps off the entire diseased endothelium with DM in the recipient eye.

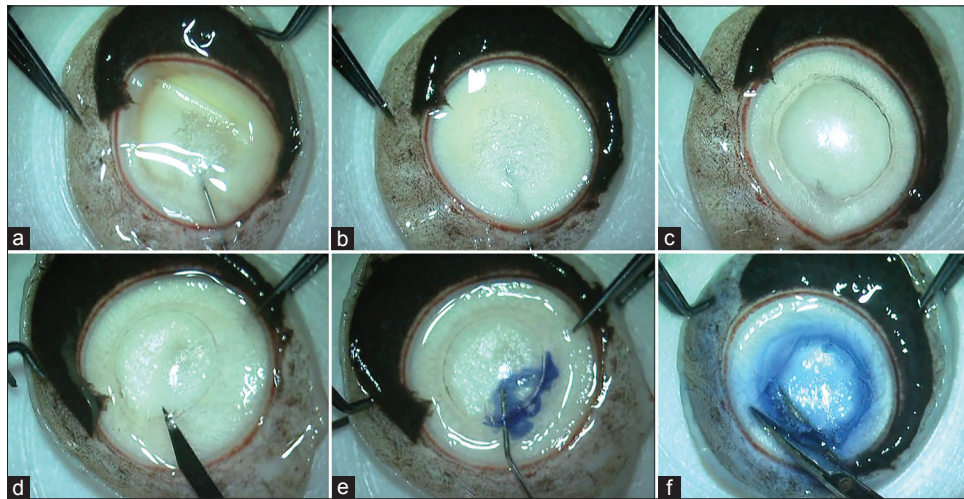


Figure 1: Preparation of the pre-Descemet's endothelial keratoplasty graft. (a) The corneo-scleral rim is placed with the endothelial side up. A 30 G needle connected to a 5 ml syringe enters the corneo-scleral rim into the mid-periphery of the corneal stroma and air is injected. (b) Small bubble starts forming in the center. (c) Type-1 bubble is formed. (d) The peripheral edge of the bubble is ruptured with a side-port entry. (e) Trypan blue injected into the bubble. (f) The graft is cut all around with a corneo-scleral scissors creating a pre-Descemet's endothelial keratoplasty graft. This graft has the endothelium, Descemet's membrane, and the pre-Descemet's layer

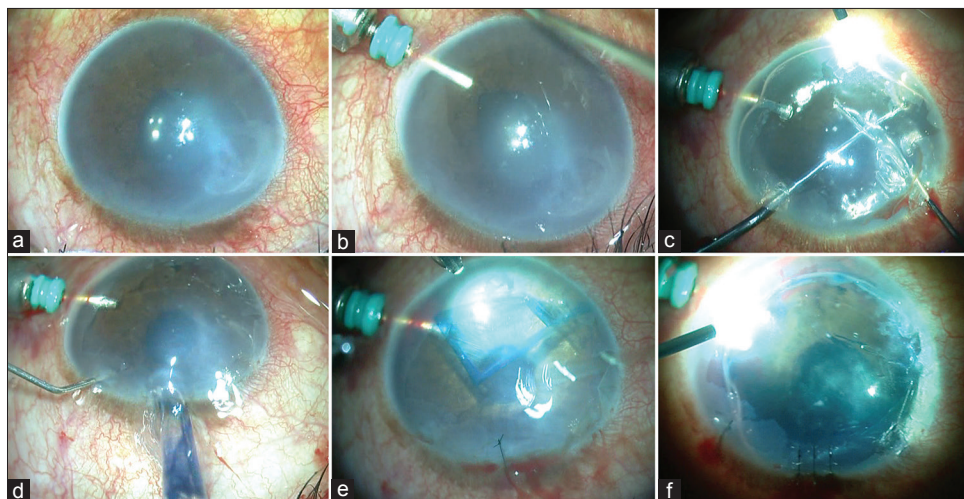


Figure 2: Surgical technique of pre-Descemet's endothelial keratoplasty. (a) Pseudophakic bullous keratopathy. (b) Trocar anterior chamber maintainer (trocar anterior chamber maintainer) is fixed. (c) The trocar anterior chamber maintainer is connected to an air pump, which infuses air continuously into the anterior chamber. A reverse Sinsky hook is used to remove the diseased endothelium and the Descemet's membrane. (d) The pre-Descemet's endothelial keratoplasty graft is injected into the anterior chamber and the air pump is switched off. (e) An endoilluminator is used to check the correct orientation of the graft. (f) Once graft is unrolled, air is injected under the graft and the air pump is switched ON

Descemetorhexis can be performed from the main corneal incision or from the side port incision as preferred by the surgeon [Fig. 2c and Clip 1: Supplemental Video Online]. The scrapped complex is then removed from the AC with the help of forceps.

Donor Graft Insertion

Initially, the donor graft is loaded on the cartridge of a foldable intraocular lens (IOL) injector [Fig. 2d], the procedure that is improvised by Price *et al.* where the sponge tire and the spring of the injector are removed followed by re-attachment of the sponge tire.^[20] Removal of the spring prevents any back suction of the graft and it thus avoids any damage that might occur inadvertently to the donor graft.

The donor graft is then injected into the AC and is unrolled using air and fluidics. The PDEK graft rolls like a DMEK graft with the endothelial side on the outer side of the roll [Fig. 2e]. Proper and correct orientation of the graft is essential and it is done so using an endo-illuminator that is focused on the surface of the cornea that highlights the rolled edges of the graft.^[21] Air is injected inside the AC that pushes the graft on to the bare surface of the recipient bed [Fig. 2f and Clip 1: Supplemental Video Online]. Corneal sutures are taken to close the corneal incision and prevent any escape of air that can be detrimental as loss of air can lead to graft detachment.

Postoperative Care

All the patients undergo pressure patching and supine positioning. Postoperatively, all the patients are advised to lie supine for 1–2 hours and also to lie supine for the most part during the 1st postoperative day. From the 1st postoperative day, 0.1% dexamethasone sodium phosphate and moxifloxacin eye drops are administered every 2 hourly for 1 week and then every 4 hourly for the next 3 weeks. Topical steroid drops are then tapered slowly over a period of the next 3 months and are then instilled once daily from the 4th month onward.

Combined Procedures

Pdek + glue-assisted intrascleral haptic fixation of glued intraocular lens

Corneal decompensation is often associated with aphakic bullous keratopathy or with a pseudophakic bullous keratopathy (PBK) due to malpositioned IOLs [Fig. 3]. In such a situation, the dual procedure of EK with secondary IOL fixation is warranted. As glued IOL is our preferred method of IOL fixation, this forms an appropriate circumstance where PDEK can be combined with glued intrascleral fixation of IOL [Figs. 3 and 4].^[22-29] The combined procedure can be performed as a single-stage or as a two-stage procedure.^[23] The rationale behind performing it as a single-stage procedure is that the patient is exposed to surgery just once and needs fewer follow-ups as compared to a two-stage procedure where the glued fixation is performed first along with the pupilloplasty procedure if necessary. Once the inflammation subsides, the PDEK procedure can be done. The initial procedure comprises glued IOL fixation wherein two partial thickness flaps are made 180° opposite to each other followed by externalization of the haptics of a 3-piece IOL. The haptics are then tucked into scleral pockets, and the flaps are sealed with fibrin glue. In cases with PBK associated with malpositioned IOLs, it is mandatory to remove the faulty IOL first followed by placement of a new 3-piece IOL with glued IOL procedure. In cases with a malpositioned 3-piece IOL, the haptics of the same IOL can be externalized and tucked obviating the need to explant and then re-fixating the IOL.

Pupilloplasty

Pupilloplasty is often performed to prevent the escape of air from the AC to the vitreous cavity.^[23] Performing a pupilloplasty is specially indicated in cases with iris defects that can be surgically corrected. There are many advantages of performing pupilloplasty in a way that, along with secondary IOL fixation, it helps to compartmentalize the eye into AC and

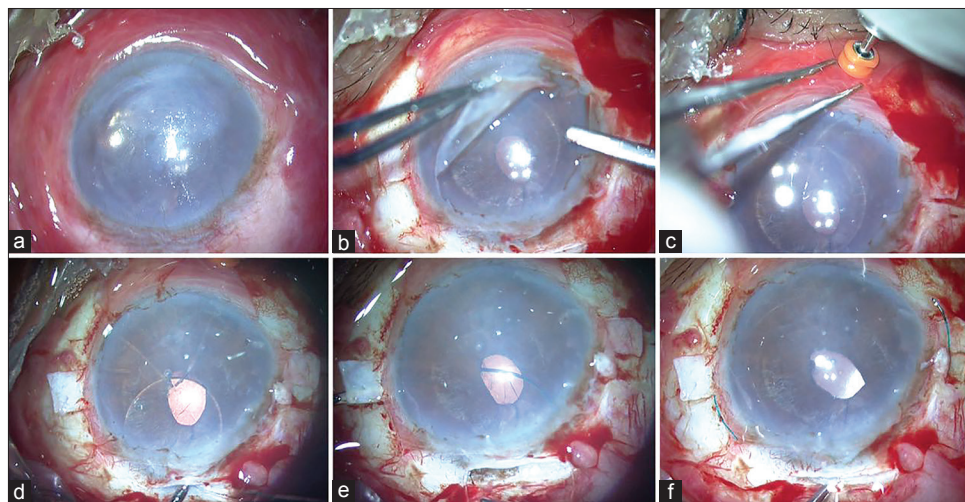


Figure 3: Pre-Descemet's endothelial keratoplasty with glued intraocular lens and single-pass four-throw pupilloplasty for scarred cornea with epithelial debridement. (a) Scarred cornea with intraocular lens in anterior chamber. (b) Epithelial debridement done that peels off the superficial fibrosis and enhances intraoperative visualization. (c) Fluid Infusion cannula placed at pars plana and two partial-thickness scleral flaps at 180° are made followed by sclerotomy with a 22-G needle beneath the scleral flaps. (d) Scleral tunnel is made and the anterior chamber intraocular lens is explanted. (e) A 3-piece intraocular lens is introduced inside the anterior chamber for glued intraocular lens fixation. (f) Both haptics are externalized

posterior chamber, thereby acting as a diaphragm. It also helps to create an adequate air pressure in the AC that facilitates graft adherence to the recipient bed.

The surgical procedure of choice for performing pupilloplasty is single-pass four throw technique (SFT)^[30] wherein a 10-0 suture on a long-arm needle is passed from both the iris leaflets that are to be apposed [Fig. 5]. A Sinskey's hook is passed and a loop is created from which the suture end is passed four times through the loop. In short, four throws are taken from the loop following which both the ends are pulled and the loop slides into the eye approximating the iris leaflet. The advantage with SFT is that only approximation of the loop occurs and the second securing knot is not taken. The helical structure created holds on to the iris tissue without any compression and as there is no knot, the chances of knot rubbing onto the donor

graft is obviated in cases where there is a shallow AC due to any reason.

Double Infusion Cannula Technique

Controlled pressurized air infusion in the AC for graft adherence in EK has been described before by Meisler *et al.*^[31] In double infusion cannula technique, two infusion cannulas are placed for optimizing the surgical outcomes of combined PDEK with glued IOL procedure [Fig. 6]. The first infusion cannula is placed at pars plana for infusing fluid inside the globe [Fig. 6a]. This facilitates the glued IOL procedure and helps to keep the eye taut during the secondary IOL fixation. Once the IOL is securely fixated, a trocar-ACM is introduced about 0.5 mm away from the limbus creating a bi-planar incision and entering the eye in front of the iris tissue [Fig. 6b]. The trocar-ACM is connected

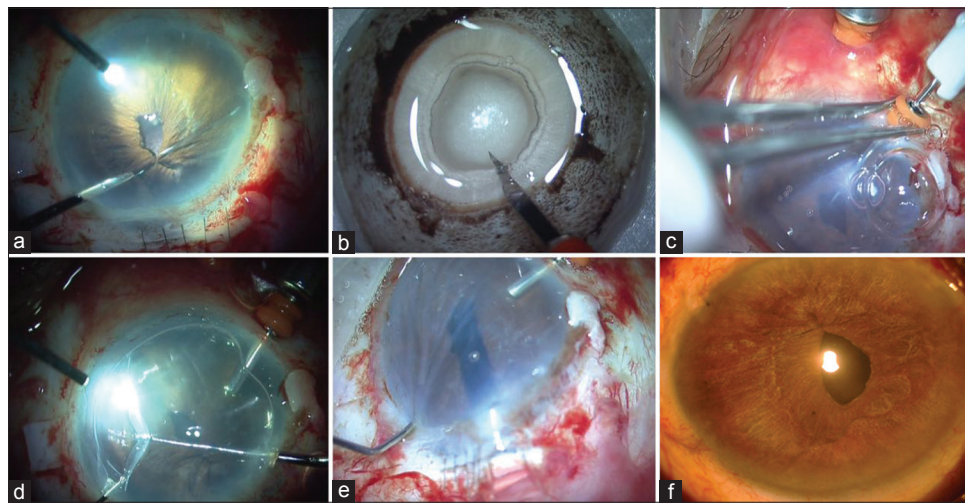


Figure 4: Pre-Descemet's endothelial keratoplasty with glued intraocular lens and single-pass four-throw pupilloplasty for scarred cornea with epithelial debridement. (a) Single-pass four throw pupilloplasty is performed for pupil reconstruction. (b) Type-1 bubble for pre-Descemet's endothelial keratoplasty is punctured at its periphery for trypan blue staining. (c) Trocar anterior chamber maintainer is introduced. (d) Descemetorhexis under air. (e) Graft being injected inside the eye. (f) Postoperative image at 3-month follow-up

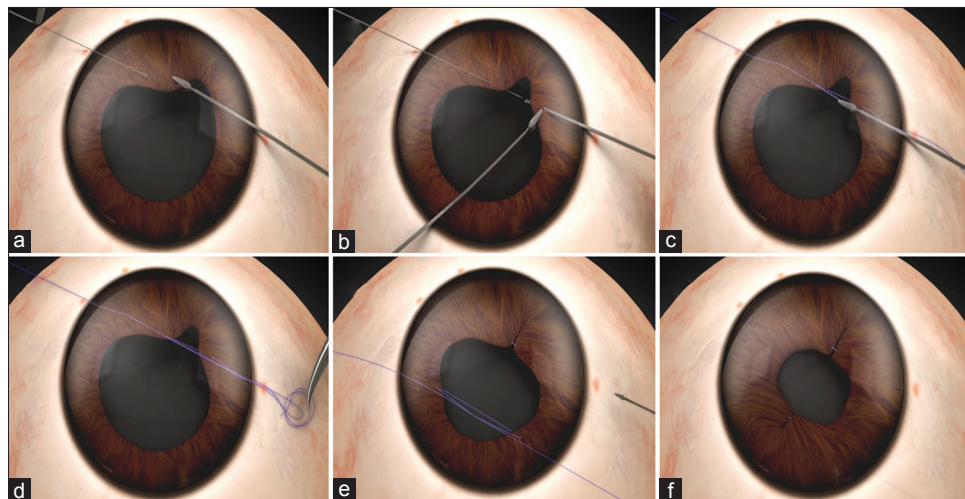


Figure 5: Single-pass four-throw pupilloplasty. (a) A 10-0 suture attached to the long arm of the needle is passed from the proximal part of the iris tissue. (b) A 26-G needle is passed from the opposite end and the tip of the 10-0 needle is anchored on to the barrel of 26-G needle. (c) A loop is formed into the anterior chamber by hooking along the suture. (d) The suture end is passed through the loop until four throws are taken with each throw passing through the loop. (e) Both the suture ends are pulled and the loop slips inside the anterior chamber. (f) Pupilloplasty is done

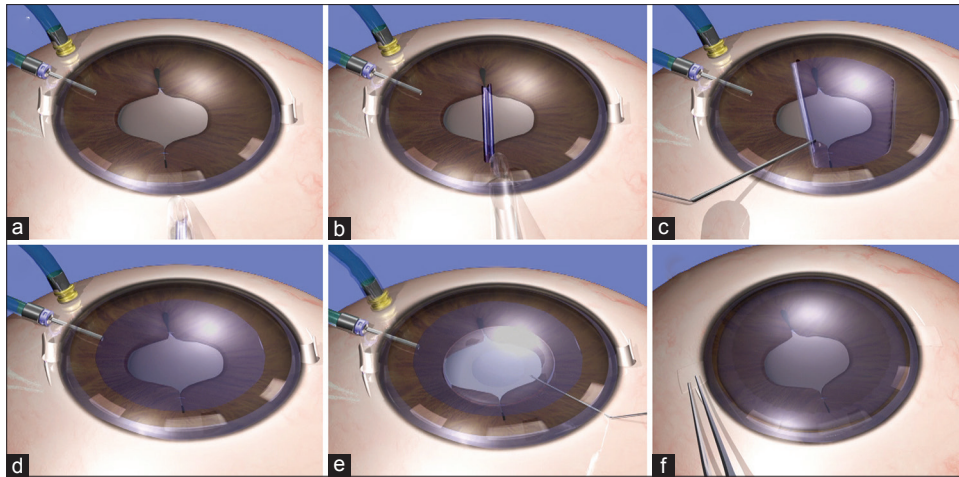


Figure 6: Double infusion cannula technique. (a) First cannula for fluid infusion is placed at pars plana and second infusion cannula is placed in the anterior chamber. (b) Pre-Descemet's endothelial keratoplasty graft is injected inside the eye with the foldable intraocular lens injector. (c) Peripheral edges of the graft are unrolled using a reverse Sinskey's hook. (d) The entire graft is unrolled completely. (e) A small air bubble is injected beneath the graft followed by pressurized air infusion that is switched ON. (f) The graft adheres well to the recipient bed and fibrin glue is applied to seal the scleral flaps

to the constellation machine that pushes air inside the eye as desired.

Descemetorhexis is performed under air and the diseased DM-endothelium complex is removed. The graft that is loaded inside the cartridge of the foldable IOL is then injected inside the eye. At this point of time, air infusion is stopped and the gentle flow of fluid from the posteriorly placed infusion cannula seeps into the AC that forms an ideal situation for the graft to float and slowly unfold inside the AC [Fig. 6b and c]. After correct orientation of the graft is confirmed, pressurized air infusion is switched ON [Fig. 6d-f]. This pushes the graft against the recipient bed and facilitates proper graft adhesion. The pressurized air is infused at a steady pressure of 50 mmHg for 30–45 s. This vaults and pushes the donor graft against the host cornea and promotes graft adherence.

Due to loss of air tamponade, donor disc detachment and loss of donor tissue into the vitreous cavity have been reported in aphakic cases.^[20,32] Use of fixation sutures onto the donor disc has been reported to prevent the loss of donor tissue into the vitreous cavity.^[33] To overcome this issue, we first believed in fixing an IOL by glued IOL technique that encompasses the first aspect of treatment followed by treatment of the diseased/traumatized host endothelium [Clip 2; Supplemental Video Online].

Discussion

The rationale and theory behind performing PDEK has been proposed and described by Dua *et al.*^[17] and was first performed by Agarwal *et al.*^[18] that clearly demarcated the difference between the types of bb achieved, its documentation, and its clinical significance. DMEK^[12,16,34,35] or DMEK with stromal support^[36] has been inadvertently performed earlier as described in certain studies without being aware of the theory of the cleavage planes created by air injection into the corneal stroma.

Dua *et al.*^[17,37] described different cleavage planes to achieve different types of bbs. Achieving a Type-1 bb [Fig. 7a and b]

is an essential and a pre-requisite for performing a PDEK procedure. Type-1 bb is typically dome shaped that spreads from center to periphery and is around 8 mm in diameter. The air separates the PDL along with the DM-endothelium complex from the remaining stroma. This bb does not spread to the periphery of the corneo-scleral rim. Type-2 bb [Fig. 7c and d] is large that extends up to the periphery and spreads from periphery to center. This bb comprises DM-endothelium complex separated from the PDL and the remaining stroma. The Type-2 bb is larger with a thinner wall that is susceptible to rupture. Type-3 is a mixed bb [Fig. 7e and f] where both Type-1 and Type-2 exist together.

The graft size that is achieved in PDEK is approximately 7.6 ± 0.22 mm in diameter^[18] that is comparatively less as compared to DMEK grafts that are around 10 mm in diameter. This occurs due to peripheral adhesions between the PDL and the DM that prevents the extension of air bb far into periphery. As the DMEK graft is larger, it tends to cover more area of the recipient bed as compared to PDEK graft that is comparatively smaller. However, a smaller graft undergoes less compression while being injected inside the AC. *Ex vivo* studies have demonstrated the endothelial cell density (ECD) loss to be almost identical in both PDEK and DMEK procedures when prepared by pneumodissection, and that PDEK graft preparation is a viable technique.^[38] Table 1 gives a greater insight into the various types of EK procedures that are currently being performed by surgeons worldwide.

Graft thickness

Studies have demonstrated that the visual outcomes of DMEK and ultra-thin DSAEK (UT-DSA EK) are almost overlapping and comparable as against DSAEK that are comparatively at a lower level with increased graft haze.^[39] The thinner graft directly leads to lesser amount of donor stroma being transplanted that theoretically translates in to early clearance of stromal tissue. As measured on optical coherence tomography (OCT), the mean graft thickness achieved in PDEK is approximately 28 ± 5.6 μm ^[18] that is comparatively thinner

Table 1: Comparison of different endothelial keratoplasty procedures

	DMEK	PDEK	DSEK
Graft size (mm)	10-10.5	7.5-8	10-10.5
Type of bb	Type 2	Type 1	NA
Donor age	Dependent; >40 years preferred	Independent	Independent
Surgical layers	DM + endothelium	PDL + DM + endothelium	Stroma + PDL + DM + endothelium
Technical difficulty	Difficult	Moderate	Easy
Donor tissue loss	Yes	Yes	Minimal
Type of procedure	Tissue neutral	Minimally tissue additive	More tissue additive
Artificial anterior chamber	NA	NA	Required
Automated versions	DMAEK	PDAEK (clinical trials)	DSAEK
Eye bank prepared donor tissue	Yes	Yes	Yes
Graft unrolling	Difficult	Moderate	Easy
Tissue handling	Difficult	Good	Good
Visual recovery	Fast	Fast	Comparatively slow

NA: Not applicable, bb: Bubble, DMEK: Descemet's membrane endothelial keratoplasty, PDEK: Pre-Descemet's endothelial keratoplasty, DSEK: Descemet's stripping endothelial keratoplasty, DMAEK: Descemet's membrane automated endothelial keratoplasty, PDAEK: Pre-Descemet's automated endothelial keratoplasty, DSAEK: Descemet's stripping automated endothelial keratoplasty, DM: Descemet's membrane, PDL: Pre-Descemet's layer

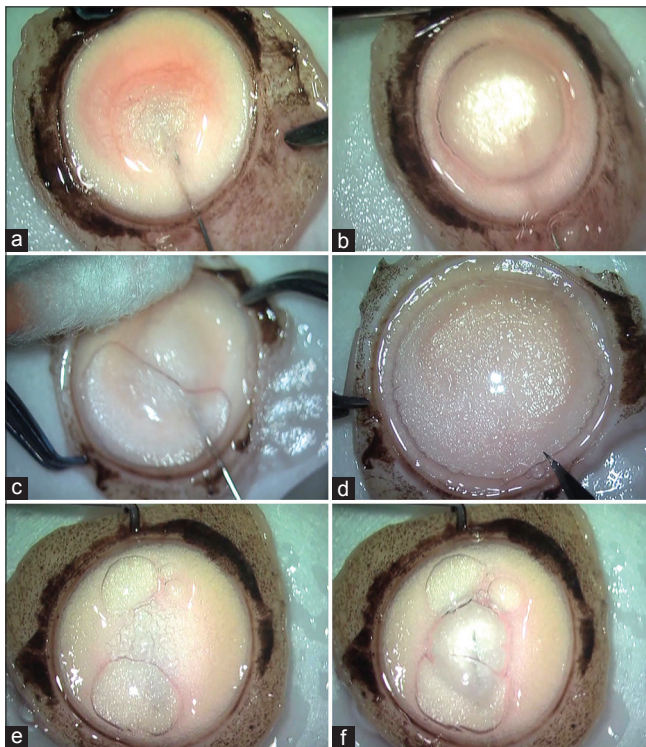


Figure 7: Types of big bubbles. (a) Thirty grams needle connected to a 5 ml syringe injecting air into the stroma with the endothelial side up of the corneo-scleral disc. (b) Type-1 bubble. Note the bubble forms from the center and does not extend up to the periphery. (c) Type-2 bubble forming. Note the bubble is starting in the periphery. (d) Type-2 bubble extends up to the periphery. The air lies between the endothelium and Descemet's membrane on one side and the pre-Descemet's layer on the other side. (e) Multiple small peripheral Type-2 bubble is forming. (f) A Type 3 bubble is formed

as compared to DSAEK or UT-DSAEK. Moreover, the donor tissue in PDEK is obtained with minimal instrumentation and does not necessitate the use of expensive microkeratomes to obtain donor lenticule as in UT-DSEK or DSAEK.

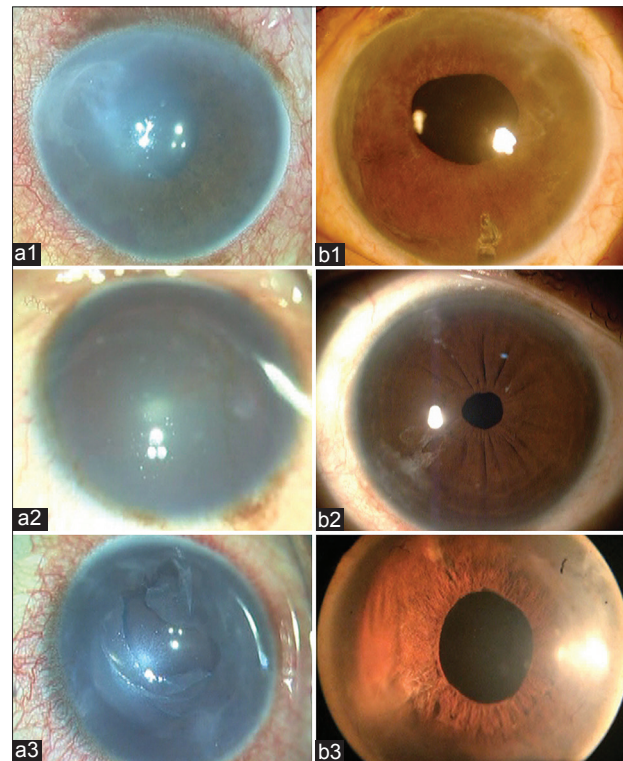


Figure 8: Pre- and post-operative images of pre-Descemet's endothelial keratoplasty cases performed with young donors. (a) the preoperative image and (b) the postoperative image. (a1) Pseudophakic bullous keratopathy (same case as Figure 3). (b1) Six-month postoperative Vision 20/20. (a2) Fuch's dystrophy with cataract. (b2) Six-month postoperative pre-Descemet's endothelial keratoplasty with phaco and intraocular lens implantation Vision 20/20. (a3) Pseudophakic bullous keratopathy. (b3) Three-month postoperative Vision 20/20

Infant donor cornea

Although lots of controversies surround the optimal age of donor tissue selection, promising results have been reported with pediatric donor tissue for DSEK. Kim *et al.*^[40] have

reported good results with infant donor cornea for DSAEK whereas Sun *et al.*^[41] have reported conflicting results with neonate corneas in DSEK. In our study also favorable results were reported with the use of infant donor cornea [Clip 3; Supplemental Video Online].^[42]

There are various advantages with PDEK procedure that the presence of PDL in the donor graft provides it with splinting effect and this results into less curling of the donor tissue. The difference is more evident in young/infant donor corneas where the PDEK graft can be handled comparatively in a stable way. DMEK does not allow the use of donor tissue younger than 40 years of age due to the inability to unscroll the edges of the graft. Also, PDEK allows usage of young and infant donor corneas,^[42] thereby increasing the virtual pool of potential donors. Theoretically, due to increased ECD count in young corneas, the results should be better as compared to transplantation performed with adult or older donor corneas. Although this aspect needs to be evaluated, the potential loss of ECD in the postoperative period can be partially compensated with the initial high ECD count of the young donor cornea.

Young donor graft-assisted pre-Descemet's endothelial keratoplasty/Descemet's membrane endothelial keratoplasty for scarred cornea

A prospective study was undertaken to assess the applicability of young donor tissue in cases with anterior stromal

scarring and chronic PBK where PDEK was performed with young donor corneas with the donor tissue in the range from 9 months to 33 years.^[43] Epithelial debridement was also performed in these cases due to massive haze that was present. Corneal vascularization regressed in all the cases and there was a significant improvement in decrease in central corneal thickness with the resolution of haze, decrease in sub-epithelial fibrosis, and improvement in visual acuity [Figs. 8 and 9].^[43]

Pre-Descemet's endothelial keratoplasty clamp

Dua and Said^[44] have designed a clamp that enables appropriate handling of donor sclera-corneal discs, thereby allowing air to be injected in the corneal stroma. The clamp has a side port for the insertion of the needle that can be attached to an air-filled syringe. The clamp has 2 rings of 9 mm diameter that prevent escape of air and facilitate formation of Type-1 bb by shutting the fenestrations in the periphery of the PDL and thus avoid the formation of Type-2 bb. Thus, it consistently helps to obtain the PDEK tissue without the risk of separating a DM and formation of Type-2 bb that would otherwise force the surgeon to perform a DMEK instead of PDEK. Studies have revealed that, by pneumodissection, a Type-1 bb is obtained in 80% of the cases. Usage of PDEK clamp allows the formation of only Type-1 bb and thus enhances the accuracy of donor graft preparation.

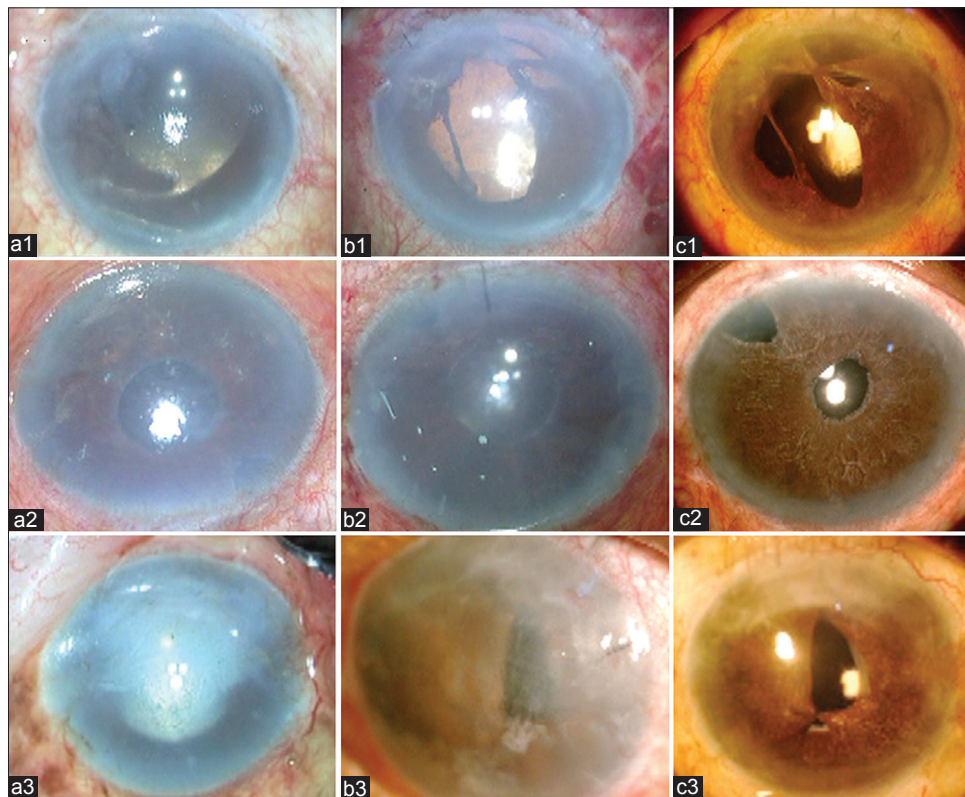


Figure 9: Pre-Descemet's endothelial keratoplasty with single-pass four throw pupilloplasty and glued intraocular lens. (a) preoperative, (b) after glued intraocular lens and single-pass four throw if needed and (c) postoperative after pre-Descemet's endothelial keratoplasty. (a1) Pseudophakic bullous keratopathy. (b1) One month after glued intraocular lens. anterior chamber intraocular lens explanted glued intraocular lens done with single-pass four throw pupilloplasty. (c1) One-year postoperative after pre-Descemet's endothelial keratoplasty Vision 6/9. (a2) Aphakic bullous keratopathy. (b2) Two weeks after glued intraocular lens. (c2) One year after pre-Descemet's endothelial keratoplasty Vision 20/20. (a3) Subluxated intraocular lens with severe corneal haze. (b3) One month after glued intraocular lens and single-pass four throw. (c3) One year postoperative after pre-Descemet's endothelial keratoplasty Vision 20/20

Mouse sign for inverted graft

Accidental reverse insertion or unfolding of the PDEK graft can occur in the AC. Failure to detect it in the postoperative period can lead to graft detachment and nonclearance of corneal haze. Upon OCT evaluation in these cases, "Mouse sign" can be detected that depicts the one end of the graft attached to the cornea while the other end is detached with a convex configuration resembling the "computer mouse."^[45] The partial attachment of the graft and the end scroll together gives the mouse configuration. Upon detection of mouse sign, rebubbling should not be attempted as it will not accomplish the desired outcome and instead a graft exchange or a re-inversion should be performed.

Pre-Descemet's Endothelial Keratoplasty in Failed Grafts/Re-Pre-Descemet's Endothelial Keratoplasty

We have a clinical experience of performing re-PDEK in 23 cases that had failed grafts due to previous PK, DMEK, DSAEK, or failed PDEKs. The mean preoperative and 3-month postoperative CCT were $727.8 \pm 84.9 \mu\text{m}$ and $585.3 \pm 72.7 \mu\text{m}$, respectively. There was significant reduction in CCT at 3 months ($P = 0.000$). There was significant improvement in the CDVA ($P = 0.000$) and there was no incidence of graft dislocation or detachment. However, we have observed that 8% of the cases that undergo re-PDEK often experience graft failure and this can be attributed to the DM stripping that can slacken the adhesion of old DSAEK graft. Loose adhesion of the preexisting graft and early postoperative secondary procedure aggravate the challenges.

Pre-Descemet's Automated Endothelial Keratoplasty

Dickman *et al.* introduced the concept of harvesting a pre-Descemetic graft that is $<50 \mu\text{m}$ using a novel vacuum-assisted microkeratome.^[46] They performed this method in 69 organ-cultured human donor corneas and concluded that the new technique of harvesting a PDAEK graft was reproducible and overcame many limitations of microkeratomes that are currently employed for graft harvesting. Yet its application and evaluation of results when performed in human eyes is a matter of interest that needs to be evaluated.

Eye Bank-prepared Pdek Grafts

In collaboration with SightLife USA, eye bank-prepared PDEK graft is made available to all surgeons across the United States of America. This decreases the fear of donor tissue loss during graft preparation and also ensures proper utilization of resources. Studies are underway that will help evaluate the results of PDEK with eye bank-prepared donor grafts, and if successful, it will help the surgeons to overcome the hurdle of creating a Type-1 bb in all the cases.

PDEK is a cost-effective procedure that is technically easier as compared to DMEK and also provides favorable visual outcomes [Fig. 10]. To conclude, we feel that, although PDEK is a new variant in EK procedure, it will undergo refinement as more and more surgeons adopt it over a period of time and share their clinical experiences.

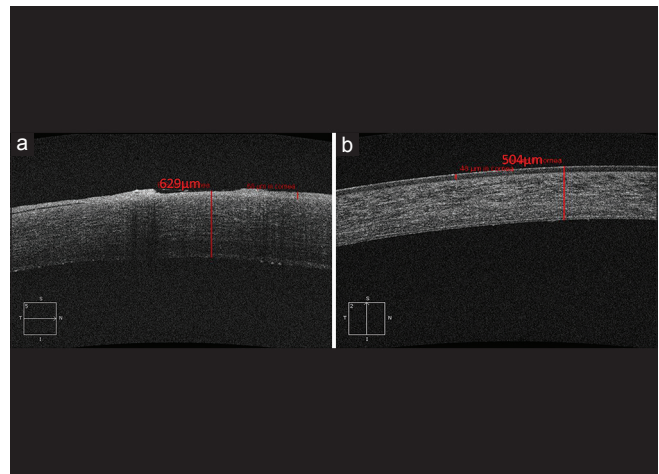


Figure 10: Pre- and post-operative image on optical coherence tomography. (a) Preoperative cornea with epithelial hypertrophy and subepithelial haze and increased corneal thickness. (b) Postoperative after pre-Descemet's endothelial keratoplasty at 3 months with reduced corneal thickness and well apposed graft and decreased subepithelial haze

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Conflicts of interest

There are no conflicts of interest.

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