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Editorial

Current Trends in Endothelial Keratoplasty

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Human cornea is the anterior transparent layer of the eye globe. It is an avascular tissue that is directly exposed to the external environment. Cornea focuses the surrounding image by refracting the light through a crystalline lens to the retina. Therefore, its clarity should be well maintained for optimal visibility [1]. Cornea is a multilayered tissue and each layer has its own specificity. The endothelium that is the posterior monolayer is responsible for maintaining the required transparency of the cornea. Trans-membrane ion channels of the corneal endothelium are responsible for pumping the water, ions and solutes out of the cornea [2]. However, if the corneal endothelium is damaged then it leads to increased water content in the cornea further inducing oedema and hence opacity which is responsible for corneal blindness [3]. In general, human corneal endothelial cells (HCECs) maintain the transparency and thickness of the cornea [4].

Fuchs dystrophy is considered to be the major cause of endothelial replacement. The only recognized treatment for endothelial disorders so far is a corneal replacement. Penetrating keratoplasty (PK) is the most popular choice among the surgeons to treat endothelial disorders. However, with the recent advancements, endothelial keratoplasty (EK) has shown clinically relevant results like early rehabilitation rate and better visual outcome over PK and is gradually been accepted by the surgeons due to standardized procedures [5]. However, due to the donor shortage, the transplantation options remain limited. Corneal endothelial dysfunction has been treated by full-thickness corneal transplantation (PK) for more than 90 years, but more selective corneal endothelial replacement such as Descemet Stripping Automated Endothelial Keratoplasty (DSAEK) and Descemet Membrane Endothelial Keratoplasty (DMEK) were developed in the last decade [6,7]. The clinically successful outcomes of DSAEK and DMEK imply that reconstruction of the corneal endothelium is a definitive treatment that can replace full thickness corneal replacement.

EK selectively replaces the diseased corneal endothelium with healthy donor tissue through a small limbal incision while retaining the healthy anterior part of the patient's cornea. This surgical technique has multiple advantages over PK as the recipient cornea remains structurally intact and resistant to injury. In addition, since it is a suture-less surgery, the results lead to quick rehabilitation and better visual outcomes. In general, the recipient eye is maintained much stronger as compared to PK.

Innovations in EK with modification in donor preparations have broadened its use and improved intraoperative ease, and reduced postoperative complications have therefore been responsible for its emerging popularity [8]. DSAEK is less traumatic as it utilizes a mechanical microkeratome to simplify the donor tissue dissection, thus, making the procedure more standardized, reproducible and easy with lesser damages to the prepared graft. Descemet membrane with endothelium with a part of the stroma is transplanted in DSAEK. Furthermore, as the anterior corneal surface is not manipulated, it does not result in any of those refractive errors that are usually seen after PK. However, it might show a slight hyperopic shift due to changes in the curvature or astigmatism.

Posterior membrane which includes Descemet's membrane and the endothelial cells is excised and transplanted in DMEK. Majority of the tissues for DMEK are prepared using stripping or bubble techniques. The thinnest possible lamellar graft is transplanted with the intention of better and faster visual recovery and post-op outcomes. There are several methods that have been introduced which have different approaches to excise the DMEK graft, preserve and supply as either precut tissue from the eye banks or pre-prepared at the surgical theatre. However, there is a lack of a standardized method which can repeatedly prove the reduction of risk or complications that

are usually seen due to unidentified parameters like mortality and other risks or complications such as graft failure due to detachment or poor endothelial cell count post-op. Apart from pre-cut tissues that have already taken up a huge market in the field of EK. Recently, pre-loading DSAEK [9] and DMEK grafts [10] have also been introduced which would cut down the preparation time and tissue wastage in the theatre. New trends in the field of EK have been evolving dramatically and it is approaching quickly in the clinics.

Thus, we foresee that standardizing the EK methods (both, preparation and surgical) will reduce unnecessary manipulation of the tissue in the operating theatre and reduce the high surgical skill or risk quotient. A supply of pre-cut tissue for DSAEK and DMEK has already started which would reduce the overall intervention costs and save time. The final graft would reduce the severe efforts of manipulation by the surgeons thus providing better quality tissue for patients. Pre-loaded tissues will mark the new era of EK in the near future.

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