The emergence of endothelial keratoplasty (EK) represents the beginning of a new era in the treatment of corneal endothelial disorders which continues to evolve. Fifteen years ago we were performing penetrating keratoplasty for Fuchs’ dystrophy and bullous keratopathy but nowadays we are performing selective replacement of the diseased endothelial layer. In recent years two techniques of EK have risen and prevailed among others; Descemet’s stripping automated endothelial keratoplasty (DSAEK) and even more recently Descemet’s membrane endothelial keratoplasty (DMEK). In this issue, two articles on EK are published, one on DSAEK and the other on DMEK.

DSAEK is currently the most common type of EK performed worldwide, but published literature has shown that DMEK has better visual outcomes and with current standardised techniques has also similar endothelial cell loss compared with DSAEK. Moreover, the majority of patients preferred DMEK over DSAEK in a contralateral study. DMEK has the lowest risk of immunological rejection of all types of corneal transplantation because it only replaces Descemet’s membrane and endothelium.

DMEK graft preparation is less expensive than DSAEK because it does not require a microkeratome. Trained eye bank technicians can currently prepare grafts with low rate of tissue-processing failure. In addition, due to shortage of corneal donors worldwide, the possibility of using one donor cornea for preparing Descemet’s membrane for DMEK and full thickness stroma for deep anterior lamellar keratoplasty (DALK) in eye banks is promising. There are also temptations to split a single Descemet membrane for use in 2 or even 4 patients.

Despite all its advantages, DMEK surgical technique is more challenging than DSAEK and the steep learning curve still remains a major drawback when established DSAEK surgeons consider adopting the technique. In that scenario transition towards DMEK seems to happen gradually and slower than initially predicted. Graft detachment requiring air re-bubbling is common in DMEK; especially during the learning curve. This steep learning curve and higher risk of complications for novice surgeons are main barriers for them to transform from DSAEK to DMEK and decrease their motivation for changing their preferred technique as they already have very good results with DSAEK.

There are steps that can help surgeons to have a smoother transformation from DSAEK to DMEK. Education is the most substantial part. Experiencing the surgical steps in a wet lab is very helpful. Surgeons can practise graft harvesting and handling. They can learn DMEK surgical maneuvers in an artificial chamber. They should be supervised by well-experienced trainers to explain every step and mention the tips and tricks. Publishing and sharing results for DSAEK and DMEK surgery in journals and conferences can help surgeons manage their patients more effectively.

The results of endothelial keratoplasty studies should be published with more details. The studies should cover sufficient sample size (ideally with specific etiology) with least 6 to 12-month follow-up time. Patients should be carefully matched before studies. Although preoperative cornea edema duration has been neglected in many studies, it affects final visual outcomes due to irreversible subepithelial fibrosis. Besides visual acuity measurement; contract sensitivity, light scatter and aberrometry are attractive measurements to give more information about the cornea optical quality. Studies should carefully monitor endothelial loss and rejection after surgery. The endothelial cells should be measured regularly at defined post-operative follow-up times to calculate the rate of loss per year. The relationship between post-operative topical regime and endothelial rejection should be defined clearly. Graft survival curve is very helpful for studies with long-term follow-up. Comparison between pre- and post-operative corneal keratometry and astigmatism are useful for finding out the refractive effects of surgery and more accurately estimating IOL power in triple procedures. Confocal scan is very helpful not only to measure endothelial cells but also to detect cornea haziness in any of the cornea layers (especially the
subepithelial and interface areas) and attribute it to the suboptimal postoperative visual acuity outcomes. Finally, it should not be forgotten that performing surgery is to meet patients’ needs; so evaluating patient satisfaction gives more information about surgical techniques; especially in terms of comparing them.

Although DMEK has proved superior; DSAEK still could be considered the first option in challenging cases. Situations like aphakia, aniridia, anterior chamber IOLs and glaucoma tube implantations are some examples. As DMEK become the common operation which trainees learn, DSAEK like extracapsular cataract extraction (ECCE) will become a dying art which only older corneal surgeons or specialists centres can perform. The corneal surgical community should be weary of allowing this to happen, as like ECCE, DSAEK will always be required for special cases.

The future of EK looks exciting with research into new modalities to treat endothelial dysfunction. Recently it has been published cases of complete recovery of corneal transparency after a selective central Descemotorrhesis without endothelial transplant.[17] Moreover, gene therapy and tissue engineering-based techniques to treat corneal endothelial dysfunction are currently under development.[18] Once all known problems associated with endothelial cells that includes limited proliferation ability, cellular senescence, fibroblastic transformation during culture as well as difficulties with transplantation of cultured cells will be surpassed, the days of endothelial keratoplasty as we know it will come to an end.

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