Fuchs dystrophy is among the most common indications for corneal transplant surgery. With the aging European population, its incidence will increase even more in the coming years. Fortunately, the advent of modern lamellar corneal transplant techniques has expanded treatment options. This means, however, that the ophthalmologist now must decide which of the available approaches is the best choice for patients presenting with Fuchs dystrophy. This article provides a rationale for deciding among Descemet membrane endothelial keratoplasty (DMEK), Descemet stripping automated endothelial keratoplasty (DSAEK), and penetrating keratoplasty (PKP) to treat Fuchs dystrophy.

MOST PATIENTS ARE NOW CANDIDATES FOR SURGERY

Not only do modern partial-thickness (ie, lamellar) techniques provide us with multiple options for treating Fuchs dystrophy, but they also expand the indications for transplant surgery. Now, surgery can be recommended much earlier because lamellar procedures are safer than PKP, reduce the time to significant improvement in visual acuity, and lower the risk of immune rejection. Therefore, the threshold to continue to surgery in these patients is much lower than it was formerly.

In our hands, every patient with Fuchs dystrophy who complains of a significant reduction in quality of vision is a potential candidate for surgical treatment. When deciding if surgery is the best option, we do not recommend looking exclusively at visual acuity values, as what is measured in a dark examination room may not represent the patient’s vision under all lighting conditions. For instance, just because a patient has 20/30 BCVA in the examination room does not mean he or she can drive safely in dim-light conditions or see clearly to work at a computer. Therefore, we prefer using patient complaints as the main indication. When these complaints indicate that daily activities are significantly affected—even with visual acuities of 20/30 or better—we pursue treatment with a lamellar transplant technique.

SELECT THE TECHNIQUE

Once we decide that surgery is indicated, the next step is to select the surgical technique.

DMEK. This is the most advanced form of posterior lamellar corneal transplant surgery. First, the diseased host, the Descemet membrane, is removed. Then, a donor Descemet membrane with healthy endothelium is atraumatically introduced into the anterior chamber, unfolded, and fixed with air to the denuded corneal stroma.

Generally speaking, DMEK is our preferred choice for several reasons: Compared with DSAEK, DMEK provides faster and better visual recovery, is safer, and reduces rejection rates. In fact, in our past 250 DMEK procedures, no unequivocal endothelial immune rejection was observed. When a patient has coexistent significant lens opacities, we perform triple DMEK—that is, DMEK plus phacoemulsification and IOL implantation in a single procedure—because it provides significantly more reliable refractive results compared with conventional PKP-based corneal triple procedures. In younger phakic patients, DMEK can be performed and the lens surgery postponed to later. It should be noted that phacoemulsification after DMEK is possible without significantly affecting visual acuity or endothelial cell count and without endangering the graft when care is taken not to manipulate it.

TAKE-HOME MESSAGE

- Modern lamellar techniques including DMEK and DSAEK are viable options for treating Fuchs dystrophy and expand the indications for transplant surgery.
- Compared with PKP, surgery can be recommended earlier with DMEK or DSAEK, and the time to significant improvement in visual acuity is reduced.
- The risk of immune rejection is significantly lower after DMEK than after PKP.
Our results suggest that, in phakic patients with clear lenses, the postoperative outcome after DMEK is as good as or even better than after triple surgical procedures. However, care must be taken when DMEK is performed in eyes with high hyperopia or shallow anterior chambers.

**DSAEK.** During DSAEK, the diseased Descemet membrane is removed and then replaced with a lamella of approximately 150-µm thick donor stroma with endothelium. In our experience, DSAEK is preferable to DMEK for eyes with complicated anterior chamber situations, including those with aphakia, Baerveldt implants, large iris defects, and hypotony. This is because the DSAEK lamella is easier to position and fix in these eyes. Also, eyes with coexistent retinal detachment are better treated with DSAEK because, here again, the stroma-to-stroma interface of the DSAEK lamella sticks better than the isolated Descemet membrane. Because this lamellar corneal transplant technique has a low rate of rebubbling, we also recommend DSAEK for patients in whom, for medical or social reasons, only one treatment is possible.

**PKP.** Modern lamellar techniques including DMEK and DSAEK are not suitable for eyes with manifest corneal scarring in the stroma and severe corneal neovascularization. They are also unsafe if silicone oil is inside the eye and anterior chamber. Here, PKP is the preferred technique. This procedure can also be performed to correct postoperative complications of lamellar procedures, including infections between the DSAEK graft and host tissue or fungal keratitis. If PKP has failed and the ocular surface is relatively regular, DMEK can be performed behind the graft to reestablish visual acuity without the risks of performing an additional PKP (Figure 1).

**Corneal collagen crosslinking (CXL).** Some surgeons advocate CXL to treat stromal edema in patients with Fuchs dystrophy and bullous keratopathy. However, in our hands, this technique has led to significantly delayed recovery times if subsequent DMEK or DSAEK is necessary. Therefore, we do not recommend CXL in patients with endothelial degenerations or dystrophies if future lamellar corneal surgery is planned.

**CONCLUSION**

In our practice, DMEK is the therapy of choice for Fuchs dystrophy patients, DSAEK is the back-up for complicated anterior chamber situations, and PKP is best reserved for eyes with corneal scarring and vascularization.

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