What are the important considerations when developing a surgical staging algorithm for phakic patients with endothelial dysfunction? First, plan for endothelial keratoplasty (EK), which provides faster visual recovery and is considerably safer than traditional penetrating keratoplasty (PKP). EK also requires only a small incision and leaves the eye more resistant to traumatic injury than PKP.1

If your patient has visually significant lens opacity, remove the cataract first—as either a staged or combined procedure—to create more room in the anterior chamber for insertion and positioning of the EK graft. In patients with early Fuchs dystrophy, cataract removal alone may provide satisfactory vision for a number of years before a graft is required. A major advantage with EK, compared with traditional PKP, is that it generally produces minimal refractive change.

If any lens opacity is present, even if it is not yet visually significant, it will get worse after EK either due to the surgical manipulation required to strip the recipient Descemet’s membrane and place the donor graft or due to postoperative corticosteroids. Therefore, any lens with noticeable opacity should be removed before EK is performed.

**LENS CHANGES AFTER DSEK**

Early EK techniques, including posterior lamellar keratoplasty and deep lamellar endothelial keratoplasty, were associated with high rates of cataract formation.2,3 Currently, Descemet’s stripping endothelial keratoplasty (DSEK) is the most widely used EK technique.

With little to no information in the literature on the risk factors for cataract formation after DSEK, we carefully reviewed lens changes in 60 consecutive phakic patients (median age, 52 years; range, 32–69 years) who underwent DSEK.4 Most were treated for Fuchs dystrophy, and no preoperative lens opacity was noted in any eye.

The rate of cataract extraction was 40% within 3 years after DSEK (calculated by Kaplan-Meier survival analysis).4 This correlates with rates reported after PKP;5 however, it is tenfold higher than the normal population rate of cataract in Americans of similar age, which is 3% to 4%.6 We found that patient age at the time of DSEK is a major risk factor for early cataract formation and extraction. In patients who were less than 50 years old at the time of DSEK, the rate of cataract extraction within 3 years was 7%, compared with 55% in those over 50 years old.4

**CONSIDERATIONS**

A second surgical intervention, such as a regraft, further increases the risk of cataract formation. In our series, two eyes with primary graft failure were regrafted with-
out removing the lens; both required cataract extraction within 1 year. Therefore, it is recommended to remove the lens if a regraft is required.

Surgical trauma is a well-recognized risk factor for cataract formation. In our DSEK series, anterior cortical spoking was noted in 10% of eyes; however, most of these cases occurred during the surgeon’s DSEK learning curve. Intraoperative lens trauma (Figure 1) can occur during stripping of the recipient Descemet’s membrane and endothelium or during insertion and positioning of the graft. The potential association between graft insertion method and the incidence of cataract formation deserves further study.

Posterior subcapsular cataract, noted in 17% of our DSEK eyes, can be associated with dosage and duration of topical steroids. For patients in our study, we prescribed prednisolone acetate 1% four times daily for 3 to 4 months, followed by a 3-month taper and discontinuation at 7 to 8 months.

Cataract extraction was performed without any complications using the soft-shell technique. The DSEK grafts were 8 to 9 mm in diameter, and all remained clear at last follow-up (median, 18 months; range, 1–44 months). Furthermore, no statistically significant decrease in graft endothelial cell density was detected with a median follow-up of 13 months after cataract extraction in a small group of 13 DSEK eyes.

One last consideration is to check for narrow angles secondary to the crystalline lens. DSEK can be performed in eyes with this anatomy, but it causes the angle to narrow for all practical purposes because donor tissue is added to the back surface of the cornea. This narrowing can lead to iris/graft touch and to later difficulties with cataract surgery when lens opacity develops. As the crystalline lens continues to grow and further shallow the anterior chamber, it will become more difficult to place phacoemulsification and other instruments in the eye without damaging the corneal graft. As an alternative to DSEK, Descemet’s membrane endothelial keratoplasty (DMEK) is a newer EK technique developed by Melles that involves implantation of only donor endothelium and Descemet’s membrane. DMEK does not significantly increase the recipient corneal thickness.

TAKE-HOME MESSAGE

• EK provides faster visual recovery and is considerably safer than traditional PKP.
• Any lens opacity will worsen after EK, and therefore, noticeable opacities should first be removed.
• As an alternative to DSEK, DMEK does not significantly increase the recipient corneal thickness.

We found that patient age at the time of DSEK is a major risk factor for early cataract formation and extraction.

CHECKLIST

Below is simple checklist for decision-making in your phakic patients with Fuchs dystrophy.

Minimal corneal changes, cataract, and visual complaints. If you cannot tell whether the lens or cornea is causing the visual problems, remove the lens. Most patients will do well and avoid grafting for some time. If the cornea decompensates, you can reliably perform EK with good visual results, in contrast to the unpredictable refractive results common after PKP.

Significant corneal changes and noted lens opacity. In these cases, it is best to remove the lens and perform EK.

Significant corneal changes and a possible clear lens that is hard to determine because the cornea is hazy. Consider the patient’s age: If the patient is younger than 50 years, perform EK; if the patient is older than 50 years, remove the lens and perform EK.

Significant corneal changes with relatively clear lens but narrow angle. Remove the lens and perform EK.

Francis W. Price, Jr, MD, is the Medical Director of Price Vision Group, Indianapolis, Indiana, and is Founder and President of the Cornea Research Foundation of America, Indianapolis, Indiana. Dr. Price states that he has no financial interest in the products or companies mentioned. He may be reached at tel: +1 317 814 2823; e-mail: fprice@pricevisiongroup.net.

Marianne O. Price, PhD, is the Executive Director of the Cornea Research Foundation of America, Indianapolis, Indiana. Dr. Price states that she has no financial interest in the products or companies mentioned. She may be reached at tel: +1 317 814 2990; fax: +1 317 814 2806; e-mail: mprice@cornea.org.