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Fuchs' corneal dystrophy is a dominantly inherited, progressive disorder that affects corneal endothelium. It is usually first observed in patients older than 50 years of age but can be seen in some patients in childhood. There is a progressive loss of endothelial cells with a secretion of an abnormally thickened basement membrane, leading to guttata formation. These guttata are often best seen by retro illumination but can be seen by direct illumination of the slit lamp.

Cataract surgery in patients with Fuchs' corneal dystrophy presents a challenge, because the intraocular surgery can result in an 8%-10% loss of the endothelial cells. The use of dispersive viscoelastics may lessen endothelial cell loss during surgery.

The decision as to whether to perform cataract surgery alone or cataract surgery plus Descemet stripping automated endothelial keratoplasty (DSAEK) is often complex and depends on the assessment of endothelial cell health. It is debated whether the best assessment is by endothelial cell counts or central corneal pachymetry. In our practice we have found endothelial cell counts to vary significantly and not be helpful in determining when a cornea with Fuchs' endothelial dystrophy might decompensate with a cataract surgery. Therefore, we rely on clinical appearance of the cornea (epithelial edema vs. no edema), the pachymetry measurements of the cornea, and the visual needs of the patient.

Past publications, including the Preferred Practice Pattern and Basic and Clinical Science manual for ophthalmologists, have indicated that a preoperative corneal thickness of >600 µm may be predictive of corneal decompensation, and indicates that an initial penetrating keratoplasty may be required in these patients in combination with cataract surgery. Our experience at the Wilmer Eye Institute indicates that many patients with a preoperative corneal thickness of >600 µm, as measured by pachymetry, do very well after cataract surgery and do not require postoperative penetrating keratoplasties or DSAEK.

We recently published in “Ophthalmology” a twelve year review of 136 patients with Fuchs' dystrophy who underwent phacoemulsification and intraocular lens implantation. The average preoperative corneal thickness in these was 580 µm, and fifty eyes (36.8%) had preoperative corneal thickness ≥600 µm. Postoperatively the average visual acuity of our patients 20/33. None of the eyes with a preoperative corneal thickness of <600 µm decompensated within two years after cataract surgery. Of the fifty patients with preoperative pachymetry measurements of greater than or equal to 600 µm, only 5 (10%) progressed to penetrating keratoplasty and 90% of the fifty eyes did not need a corneal transplant at least within the first one to two years after cataract surgery. These patients had an average visual acuity of 20/35 postoperatively. Based on these results, we have suggested that the preferred practice pattern for ophthalmologists extend the indications for cataract surgery in patients with Fuchs dystrophy without obvious epithelial edema to undergoing cataract extraction without keratoplasty if the corneal thickness is ≥640 µm. Patients should be counseled that they have an approximately 10% chance of needing a keratoplasty within the first one to two years after surgery and if they live long enough they may eventually need a PK or DSAEK, because this is a progressive disorder. We modify our viscoelastic use during surgery in patients with Fuchs' dystrophy to use a dispersive viscoelastic such as Viscoat or Healon 5 to offer better protection of the endothelium during the phacoemulsification portion of the surgery. No study has been performed to definitively show that this is beneficial, but it is our belief that a dispersive viscoelastic helps protect the endothelium. One disadvantage of the dispersive viscoelastic is that it may trap small nuclear fragments in the peripheral angle that are not removed during phacolysis and/or irrigation-aspiration of the remaining viscoelastic. The retention of small nuclear fragments in the anterior chamber angle after cataract surgery can be damaging to endothelium and cause decompensation of the cornea. Therefore, one must be very careful to remove all nuclear chips during the cataract extraction and/or irrigation-aspiration.

Our teaching in the past has been to perform cataract extraction alone inpatients with a Fuchs' dystrophy and a central corneal thickness of ≤640 µm. We realize that an increase in corneal thickness does lead to increase in light scatter and have found in our studies that as the corneal thickness goes above 640 µm, visual acuity begins to deteriorate. We also reported on 12 patients who had a corneal thickness between 640 µm to 680 µm, who underwent very careful cataract surgery. These were elderly and/or one eyed patients whom we thought penetrating keratoplasty or DSAEK was not warranted. Ten of the 12 cases (86%) maintain clear corneas at two years after surgery, with a median visual acuity of 20/40. There seems to be a correlation of increased corneal thickness of over 640 µm with a decrease in visual acuity, and currently we are evaluating this in a large number of Fuchs' dystrophy patients after cataract surgery.

Certainly if a patient has a corneal thickness between 550 µm and 640 µm with epithelial edema that cornea has decompensated and a PK or DSAEK is indicated. One can determine epithelial edema by retro illumination view and/or applying a cotton tip applicator to the cornea epithelium after using anesthesia to see if it is detached indicating epithelial edema.

The recent developments and popularization of DSEAK by Mellis, Terry, and Price will certainly decrease the number of PK's for Fuchs' corneal dystrophy. We still recommend a simple cataract operation if there is no epithelial edema and central corneal thickness is ≤640 µm. This in many of our patients has provided 20/20 visual acuity with a 90% chance of not needing a corneal transplant. If there is epithelial edema, and when the corneal thickness goes above 640 µm there will be decreased visual acuity due to light scatter from the stroma and epithelial edema. In these cases we are now recommending a combination of phacoemulsification removal of the cataract and DSAEK. If the case is borderline, or in a patient with one eye where cataract surgery might provide an improvement but possibly not a perfect visual acuity due to mild corneal edema, then we have suggested cataract extraction alone to see what visual acuity is obtained. If it is adequate for the patient’s needs, a DSAEK can be avoided. If visual acuity is not adequate then the patient can be treated with a DSEAK. Although DSAEK is becoming more popular, there are complications of the procedure. A recent report in Ophthalmology indicates that 10-15% of DSAEK's dislocate. Our percentage of dislocation is less then 10%. Terry has recently reported less than 2% dislocation. We have seen two cases in forty with rejection, and both of these have cleared.

In summary, we have extended the indications for cataract surgery without simultaneous corneal endothelial replacement surgery in eyes without epithelial edema to a corneal thickness of ≤640 µm and possibly to 680 µm.
The ability to perform DSAEK, which is less debilitating to the patient than PK, has encouraged us to extend the indications for cataract extraction in patients with moderate Fuchs’ dystrophy but without epithelial edema, realizing that DSAEK can be performed later if the patient does not achieve adequate visual acuity with cataract surgery alone. Since the DSAEK operation induces about -1.50 diopters hyperopic shift we aim for a postoperative spherical equivalent of -1.50 to 1.75 diopters in patients undergoing combined DSAEK and cataract extraction or in Fuchs’ patients who are undergoing cataract surgery and may need a later DSAEK.

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