

Cataract Case of the Month CME Series

EYE ON CATARACT™

CHALLENGING CASES MADE ROUTINE

This Month's Case

Cataract Surgery in a Patient With Fuchs Endothelial Corneal Dystrophy

ORIGINAL RELEASE: MARCH 1, 2016 • **LAST REVIEW:** FEBRUARY 8, 2016 • **EXPIRATION:** MARCH 31, 2017

LEARNING METHOD AND MEDIUM

This educational activity consists of a case discussion and study questions. The participant should, in order, read the learning objectives at the beginning of this case discussion, read the case discussion, answer all questions in the post test, and complete the Activity Evaluation/Credit Request form. To receive credit for this activity, please visit <http://www.tinyurl.com/EyeOnCataract-4> and follow the instructions provided on the post test and Activity Evaluation/Credit Request form. This educational activity should take a maximum of 0.75 hour to complete.

CONTENT SOURCE

This continuing medical education (CME) activity captures content from an expert roundtable discussion held in San Diego, California, on April 16, 2015.

ACTIVITY DESCRIPTION

Cataract surgery is the most commonly performed surgery among adults in the United States, and the number of patients undergoing this procedure is continuing to increase. For patients who are identified as candidates for cataract surgery, optimization of the ocular surface is critical for obtaining optimal patient outcomes. There are a host of new tools that can help cataract surgeons with their preoperative evaluations. Among these are several tests that are useful adjuncts for diagnosing dry eye/meibomian gland dysfunction. The purpose of this activity is to update ophthalmologists on recent advances in the care of patients with cataracts.

TARGET AUDIENCE

This activity is intended for ophthalmologists.

LEARNING OBJECTIVES

Upon completion of this activity, participants will be better able to:

- Select appropriate medication regimens for suppressing postoperative inflammation in high-risk patients
- Demonstrate optimal IOL selection, knowledge of appropriate refractive targets, and understanding of strategies for achieving intended goals
- Describe the benefits of new diagnostic and surgical technologies with application to cataract surgery

ACCREDITATION STATEMENT

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FOR DIGITAL EDITIONS

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Cataract Surgery in a Patient With Fuchs Endothelial Corneal Dystrophy

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Case from the files of Anthony J. Aldave, MD

A 68-year-old man presents with complaints of a slowly progressive reduction of vision in both eyes and difficulty performing daily activities. He was diagnosed with Fuchs endothelial corneal dystrophy (Fuchs) in 2003 and underwent penetrating keratoplasty (PK) in his right eye 2 years later. Posttransplant, he has been wearing a rigid gas permeable contact lens for visual rehabilitation because of high astigmatism. He has now developed bilateral cataracts and reports the vision in his left eye is blurry in the morning.

On examination, his refractions are $-1.00 +5.00 \times 070$ OD and $-3.00 +2.00 \times 090$ OS. BCVA is 20/40 OU. Slit lamp examination of the right eye shows a clear graft with compact stroma and 2-3 + NS cataract (Figure 1). The cornea in the left eye has no epithelial edema but trace to 1+ central stromal edema, with dense central guttae and pigment and a 1-2 + NS cataract (Figure 1).

Astigmatism on corneal topography is 5.31 D at 062 OD, with skewing of the radial axes, and 2.60 D at 161 OS (Figure 2). Endothelial cell density on specular microscopy is 755 cells/mm² OD and 1724 cells/mm² OS. Central corneal thickness is 570 μ m OD and >620 μ m OS.

Although PK was previously the standard procedure in an eye with Fuchs needing a corneal transplant, the standard today is an endothelial keratoplasty (EK), either Descemet stripping endothelial keratoplasty (DSEK) or Descemet membrane endothelial keratoplasty (DMEK). In patients with Fuchs and cataracts, surgeons need to determine if surgery is needed for both conditions, and, if so, whether to do a combined procedure or stage the surgeries, and in what order. These decisions

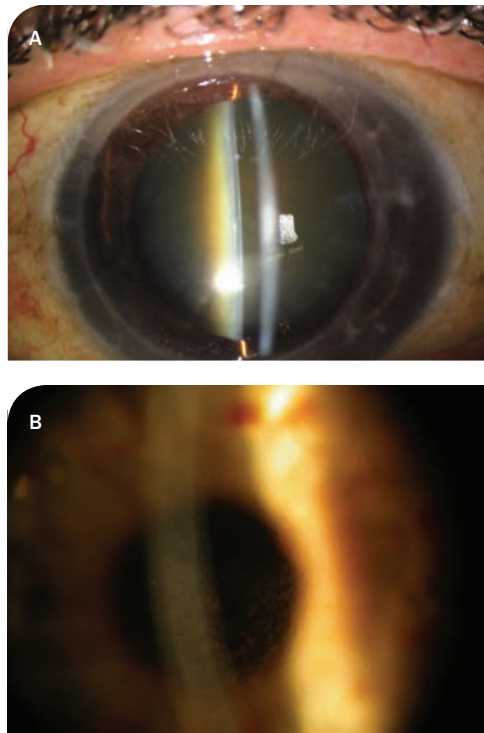


Figure 1. Slit lamp photographs of a patient with Fuchs. There is a clear PK graft and a visually significant cataract in the right eye (A) and mild central stromal edema and guttae in the left eye (B).

Images Courtesy of Anthony J. Aldave, MD

need to be individualized according to an informed discussion with the patient and taking into account multiple issues [see **Sidebar: Presurgical Counseling**]. The considerations include the relative impact of the cataract and the corneal disease on the patient's vision, whether the corneal disease is limiting visualization for performing cataract surgery, the risk of corneal decompensation after cataract surgery, and the patient's preference for undergoing 1 vs 2 procedures.

The finding of any epithelial edema would support immediate vs deferred EK because central epithelial edema is typically visually

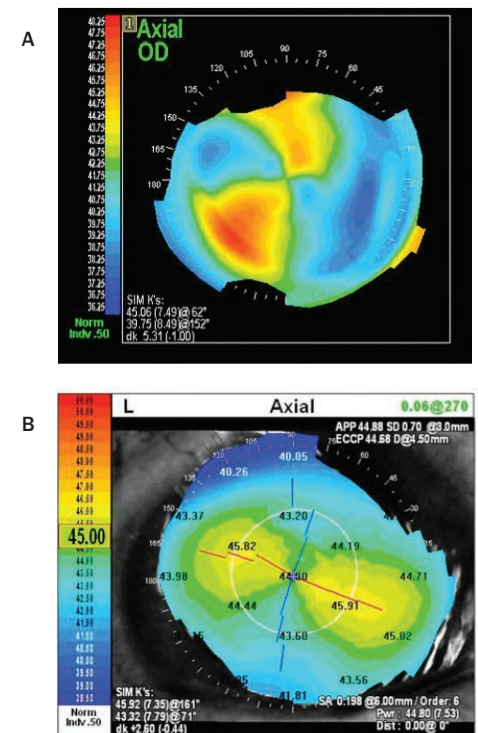


Figure 2. Corneal topographic imaging of a patient with Fuchs. The right eye (A) demonstrates high oblique astigmatism, with skewing of the radial axes following PK. The left eye (B) demonstrates moderate, regular, against-the-rule astigmatism.

significant and likely to lead to subepithelial scarring that will limit visual recovery after EK. Endothelial keratoplasty is also indicated in a patient who reports problems with blurry vision in the morning, which is a sign of early corneal decompensation that will likely be exacerbated by cataract surgery. To identify early corneal decompensation, patients should be scheduled for visits early in the morning and later in the day to measure visual acuity and pachymetry. An increase in the central corneal thickness of > 15% to 20% and/or worsening of BCVA by > 2 lines in the early morning relative to later in the day is indicative of patients who would benefit from EK.





Presurgical Counseling

Deepinder K. Dhaliwal, MD, LAc

Counseling is essential prior to any surgical procedure to obtain informed consent and set appropriate expectations regarding outcomes. Patients with Fuchs undergoing cataract surgery need to be made aware they are likely to experience a protracted visual recovery course and of the possibility of corneal decompensation as a worst-case scenario.

Understanding their corneal condition will help patients with Fuchs comprehend these risks and the importance of complying with prescribed medical therapies. Many good Web sites where patients can learn about Fuchs exist. Some examples are the Corneal Dystrophy Foundation (<http://www.cornealdystrophyfoundation.org>) and MedlinePlus (<https://www.nlm.nih.gov/medlineplus/ency/article/007295.htm>). In addition, patient support groups that are part of some Web sites can be very helpful for patients to realize they are not alone.

For all patients who have undergone cataract surgery, preoperative education by the physician that provides information about the experience and creates realistic expectations can lessen patient anxiety and increase their satisfaction.¹⁻³

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A central corneal thickness of > 640 μm has also been considered an indication for EK.¹ Its value as an absolute cut-off is questionable, however, considering the wide range of normal corneal thicknesses. Endothelial cell count (ECC) is generally not useful in guiding the decision for surgery, given the unreliability of ECC measurements in the setting of endothelial guttae. However, a very low ECC, such as < 500 cells/ mm^2 , may be considered an indication for EK.

The presence of dense central guttae, as in the patient in this case, is also an indication for EK because quality of vision may still be poor after cataract surgery, even if BCVA improves. If consideration is being given to performing EK alone, surgeons should recognize the potential for progressive lenticular opacification following surgery. Price and colleagues reported that among patients aged older than 50 years at the time of DSEK, 55% of those who were left phakic required cataract extraction within 3 years after DSEK.² This finding supports performing cataract surgery at the time of DSEK in patients aged 50 years or older who manifest any lenticular opacification.

In contrast, cataract surgery alone may be offered to patients with a visually significant cataract who have only mild stroma edema associated with their Fuchs. The obvious advantage to this approach is the avoidance of the risks associated with allogenic transplantation, ie, rejection, as well as the risks associated with chronic topical steroid use. Deferring the graft procedure will also allow patients to benefit from ongoing advances that are improving EK outcomes.

CATARACT SURGERY CONSIDERATIONS

If the decision is made to do cataract surgery alone in an eye with Fuchs, certain techniques should be employed to minimize endothelial cell loss and the risk for decompensation. The endothelium should be well coated with a dispersive viscoelastic, or the surgeon can use a dispersive-cohesive viscoelastic soft-shell technique. Phacoemulsification should be performed with a low-flow technique to

minimize intraocular turbulence. Surgeons should also be mindful of the phaco tip position so that the irrigating fluid is not directed toward the endothelium. Using a balanced salt solution as the irrigating solution may be worthwhile because it contains glutathione, a free radical scavenger.

Although some corneal dystrophies are a contraindication for the use of the femtosecond laser, Fuchs is not among them. Use of the laser for lens fragmentation may be beneficial, considering evidence that it can reduce phacoemulsification time and energy and minimize corneal endothelial trauma.³⁻⁵

IOL CONSIDERATIONS

When performing cataract surgery simultaneously with EK or in eyes with a high likelihood of requiring EK in the future, the surgeon should aim for a residual myopic refractive error (-0.50 to -1.25 D). Although it is well known that DSEK typically results in a hyperopic shift of approximately 0.75 to 1.00 D, DMEK also results in a hyperopic shift, averaging approximately -0.50 to -0.75 D.^{6,7}

A multifocal intraocular lens (IOL) should be avoided in an eye with Fuchs, whether performing cataract surgery alone or a combined procedure, because of the potential for compounding problems associated with visual aberrations and decreased contrast sensitivity. A multifocal IOL should also be avoided in any younger patient who has a strong family history of Fuchs, considering that individual's risk for developing corneal dystrophy in the future.

There is no concern about the quality of vision using an accommodating IOL in a patient with Fuchs who may need EK in the future. However, because a myopic refractive target is recommended in this situation, the patient may still need glasses for distance viewing until he/she undergoes a graft procedure. Alternatively, the accommodating IOL power can be selected to achieve the best refractive outcome after the cataract surgery. Then, if the patient undergoes EK in the future, a refractive touch-up could be performed to address any hyperopic shift that occurs.

As another consideration, vitreous prolapse into the anterior chamber may occur during DSEK in eyes with a sulcus-based IOL or an intracapsular IOL following a Nd:YAG capsulotomy. This complication may occur more frequently in recipients of the older version of the accommodating IOL with which, because of the smaller optic, there is more of a tendency for the capsulotomy to extend beyond the optic margin. This opening between the capsule and optic allows anterior movement of the vitreous humor when the lens-iris diaphragm moves posteriorly during the DSEK procedure.

Toric IOLs are appropriate in eyes with Fuchs that are undergoing cataract surgery alone or in conjunction with EK. However, a simultaneous or subsequent DSEK procedure may induce astigmatism (from corneal incisions or the nonplanar nature of the graft) and the amount may not be predictable. In such situations, DMEK is likely the preferred procedure given the small incision used to insert the DMEK graft and the fact that the graft itself does not induce astigmatism.⁸

ASTIGMATISM MANAGEMENT FOR POST-PK EYES NEEDING CATARACT SURGERY

When cataract surgery is being performed in a post-PK eye with high astigmatism, a toric IOL alone or combined with astigmatic keratotomy (AK) as needed could be considered if there is orthogonal astigmatism and a low risk for postoperative endothelial decompensation or if the patient is a candidate for EK should the PK graft fail in the future. Options for managing nonorthogonal astigmatism are photorefractive keratectomy or AK, although when using either of these techniques, they should be performed prior to cataract surgery to allow for shift in the spherical equivalent refractive error.

AK using a femtosecond laser has been performed in eyes that have undergone PK, and an analysis of outcomes in a series of 140 eyes found reasonably good predictability.⁹ AK should also be done prior to cataract surgery because it can cause a shift in the spherical equivalent refractive error.

CONCLUSION

Surgical decision making for patients with both cataracts and Fuchs needs to be individualized, taking into account features of each condition and patient preference for undergoing sequential or combined surgery, if EK is indicated.

When performing cataract surgery alone, it is important to implement techniques that will minimize corneal endothelial trauma. If EK is being performed together with cataract surgery as a staged procedure or is likely to be needed in the future, the targeted IOL power should take into account the expected hyperopic shift after EK. Cataract surgery in an eye with a prior PK provides an opportunity to correct high astigmatism, but a number of factors should be considered, including characteristics of the astigmatism (orthogonal or nonorthogonal astigmatism), the corneal endothelial cell count, and whether the patient has worn and wishes to continue to wear a rigid contact lens.

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