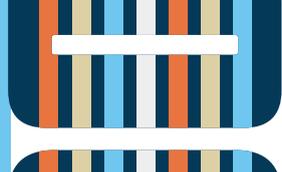
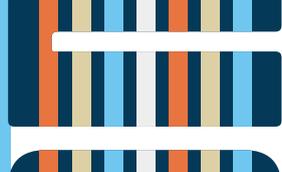
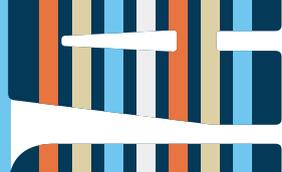
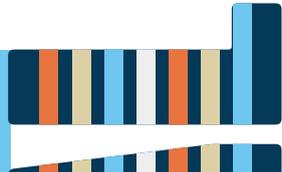
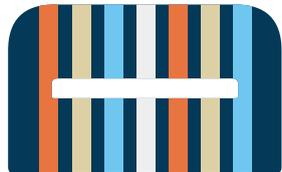
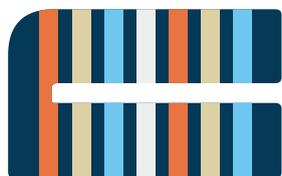


KENDALL



MD, MS

THE COMPLICATED CASES EXPERT

How Do You Approach Cataract Surgery in Patients With Diabetes?



Unique challenges regarding anterior and posterior segment changes call for meticulous planning and the right tools.

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Cataracts are a part of the normal aging process. Patients with diabetes, however, tend to develop cataracts at a younger age than their non-diabetic counterparts. Often, these patients are still busy raising their families, working full time, and driving at night when they begin to develop the signs and symptoms of cataracts. Those with poor HbA1c control and end-stage organ damage (eg, kidney, cardiac, or peripheral vascular disease) may experience even earlier cataract formation. These patients can also have some degree of ocular ischemia or other forms of retinal pathology including diabetic retinopathy and diabetic macular edema (DME) that the surgeon will have to address before cataract surgery. (Editor's note: For more on the topic of retinal pathology, see *What Do You Tell Patients Who Have Questions About Their Diabetic Eye Disease?* on pg 66.)

BACKGROUND AND CHARACTERISTICS

Diabetes mellitus is one of the most prevalent and morbid chronic diseases, affecting millions of individuals worldwide. The Global Burden of Disease study reported that the prevalence of diabetes rose 30.6% from 2005 to 2015—from about 333 million people to 435 million worldwide.¹ Three large-scale population-based studies have shown an increased association between diabetes and cataract.²⁻⁴ An increased incidence of late-onset type 2 diabetes has also been noted.⁵ Overall, it is estimated that up to 20% of cataract surgeries are performed in patients with diabetes.⁶

Anterior segment changes in patients with diabetes who present for cataract surgery can include increased epithelial fragility, reduced corneal sensitivity, altered epithelial and endothelial barrier functions, and impaired corneal wound healing.⁷ Further, accumulation of glycogen can lead to miosis and poor pupillary dilation during cataract surgery.⁸

Patients with diabetes tend to have smaller pupils, and a small pupil can lead to longer surgery and potential complications such as vitreous loss or endothelial cell damage. The surgeon should also be aware that these eyes may have previously undergone laser procedures, vitrectomy, or intravitreal injections. Eyes with previous vitrectomy can have weakened zonules, which is yet another potential risk factor for increased complications during cataract surgery. Although the incidence is rare, it is important to note that a history of intravitreal injection can be associated with damage to the posterior capsule, leading to an increased risk of dropped lens material.

MY PROTOCOL

For all patients with diabetes, I perform macular OCT to rule out maculopathy. If maculopathy is

identified, it should be discussed with the patient and possibly treated before cataract surgery. I also plan to take these cases just a little more slowly than normal, placing capsular tension rings or iris hooks to improve visualization if pupil size is limited. I may place a Malyugin Ring (MicroSurgical Technology) to achieve pupillary expansion.

In patients with poor red reflex, I often use trypan blue dye to enhance visualization. Another adjunctive tool that can facilitate surgery in patients with diabetes is intraoperative phenylephrine and ketorolac ophthalmic solution 1%/0.3% (Omidria, Omeros) to maintain pupil size. I often use laser cataract surgery in these patients to decrease the energy needed for phacoemulsification.

I have found the miLoop (IanTech) to be a helpful tool in patients with diabetes, particularly in those with

BY THE NUMBERS

30.6%
INCREASE

-----> in prevalence of diabetes¹ from 2005 to 2015

Approximate number of people
living with diabetes¹ in 2015

435
MILLION

20%

-----> Percentage of cataract
surgeries performed in patients
with diabetes²

Higher rate of endothelial cell loss during
cataract surgery in patients with diabetes³
vs nondiabetic patients

15%

1. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1545-1602.

2. Hamilton AMP, Ulbig MW, Polkinghorne P. *Management of diabetic retinopathy*. London: BMJ Publishing Group; 1996:1-15.

3. Donaldson KE. The effect of diabetes on cataract surgery outcomes. Paper presented at: Hawaiian Eye 2018; January 13-19, 2018; Wailea, Hawaii.

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THE DIABETIC EYE DISEASE EXPERT



What Do You Tell Patients Who Have Questions About Their Diabetic Eye Disease?

Educate your patients on recent pharmacologic and surgical innovations.

Patients with diabetic eye disease may be concerned when they hear that their diabetes has affected their vision. It can be challenging for cataract and refractive surgeons to answer patient questions about possible ocular complications and how they are treated. A few answers about pharmacologic and surgical innovations introduced in recent years may help calm the worries of patients with diabetic eye disease.

PHARMACOLOGY

Anti-VEGF therapy. An important innovation in the treatment of diabetic retinopathy (DR) and diabetic macular edema (DME), anti-VEGF agents can preserve visual acuity and even significantly improve vision in most patients with DME.^{1,2} Three anti-VEGF agents are widely used to treat DME: ranibizumab (Lucentis, Genentech), aflibercept (Eylea, Regeneron), and bevacizumab (Avastin, Genentech); DME is an off-label indication for bevacizumab.

A Diabetic Retinopathy Clinical Research Network (DRCR.net) study in patients with DME and baseline visual acuity of 20/50 or worse demonstrated that patients receiving ranibizumab or aflibercept had better outcomes than those receiving bevacizumab, but all three agents offered significant visual and anatomic improvements over focal laser treatment.²

Anti-VEGF therapy can also reduce vision-threatening complications associated with proliferative DR (PDR).³ Untreated PDR can cause vitreous hemorrhage and fibrovascular proliferation and lead to tractional retinal detachment or neovascular glaucoma. Another DRCR.net study showed that ranibizumab was comparable with panretinal photocoagulation

(PRP) in treating PDR and associated with a lower rate of vitrectomy.³

Clinical trials in DME found that DR severity could be decreased with anti-VEGF treatment. A DRCR.net study is investigating anti-VEGF therapy to prevent worsening of DR, including progression to PDR.⁴

Steroids. Another option for some patients with DME who do not respond sufficiently to anti-VEGF treatment is steroid therapy. The dexamethasone intravitreal implant (Ozurdex, Allergan) and the fluocinolone acetonide intravitreal implant 0.19 mg (Iluvien, Alimera Sciences) have been approved by the FDA for treatment of diabetic eye disease; these treatments are also used across Europe. Many retina specialists initiate anti-VEGF or laser therapy before administering steroid therapy because of the complications associated with steroid use, including cataract formation and IOP increase. For some patients, however, steroid therapy can be a reset button that calms inflammation and allows them to respond to other therapeutic pathways.

SURGICAL INNOVATIONS

Small-gauge surgical instrumentation and new tools for visualization. Both of these innovations have enhanced retina specialists' ability to perform surgery in diabetic patients. Modern vitrectomy platforms allow surgeons to perform minimally invasive, sutureless outpatient surgery with short recovery times. These platforms offer a range of small-gauge tools, including vitrectors, forceps, lasers, picks, diathermy, and scissors.

Valved trocars. Representing a significant innovation, valved trocars prevent fluid egress and vitreous prolapse. In surgery in diabetic patients, when bleeding can be a significant

issue due to neovascularization, valved trocars create a closed system to maintain hemostasis.

Bimanual retina surgery. Diabetic tractional retinal detachments are challenging to address in surgery. Visualization is crucial to segment and delaminate the preretinal fibrotic membranes causing traction on the retina. Bimanual retinal surgery can help to address these challenges.

In traditional vitrectomy, one hand manipulates a light pipe and the other manipulates the vitrector, laser, or forceps. The use of chandelier illumination and/or lighted instruments eliminates the need to hold the light pipe. The surgeon can create countertraction using two instruments, such as a lighted pick and forceps.

CONCLUSION

Diabetic eye disease can be scary for patients. Educating them on the recent innovations in treatment of diabetic eye disease can leave them feeling empowered and ready for referral to a subspecialist in a timely manner.

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- Financial disclosure: None

very dense cataracts. This microin-
terventional device uses a nitinol fila-
ment to ensnare and dissect nuclei
of any grade without causing capsu-
lar stress. The miLoop helps me to
reduce the amount of energy used in
grooving during phacoemulsification,
and it lessens the need for manipula-
tion of the lens in eyes with weak-
ened zonules.

ENDOTHELIAL IMPLICATIONS

Although this does not receive
much attention, individuals with dia-
betes have on average lower endothe-
lial cell counts than nondiabetic indi-
viduals.⁹ Earlier this year, I presented
the results of a study in which my
colleagues and I found that the rate
of endothelial cell loss during cataract
surgery was statistically significantly
higher in patients with diabetes (15%)
than in nondiabetic patients.¹⁰ This
study included 70 patients with diabe-
tes and 70 without, tightly matching
them for as many variables as possible,
including age, density of cataract, axial
length, anterior chamber depth, and
preoperative endothelial cell density.

Because patients with diabetes may
have delayed healing after cataract
surgery—in part owing to endothelial
cell loss—surgeons should discuss
this possibility with patients before
surgery. If you anticipate a problem,
it is always better to communicate
beforehand.

In uncomplicated cases, patients
should be maintained on a topical
NSAID for 1 month postoperatively,
with longer duration if there is a
history of DME. These are high-risk
patients, so it is important that they
be adequately treated. If the patient
is not recovering as expected, post-
operative macular OCT should be
considered to rule out DME.

CONCLUSION

Rates of both diabetes and cata-
ract are rising with the increasing age
of the population. As noted earlier,

**“FORTUNATELY, WE HAVE
ACCESS TO A GROWING
ARRAY OF SURGICAL
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MEDICATIONS TO HELP
ENSURE THAT PATIENTS
WITH DIABETES CAN ENJOY
SUCCESSFUL, COMPLICATION-
FREE OUTCOMES.”**

it is estimated that about 20% of
cataract surgeries are performed in
patients with diabetes. These indi-
viduals present surgeons with a host
of additional considerations regarding
their surgery and the complications
that can arise. Fortunately, we have
access to a growing array of surgi-
cal tools, techniques, and medica-
tions to help ensure that patients
with diabetes can enjoy successful,
complication-free outcomes and
good functional vision. ■

1. GBD 2015 Disease and Injury Incidence and Prevalence Collaborators. Global, regional, and national incidence, prevalence, and years lived with disability for 310 diseases and injuries, 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015. *Lancet*. 2016;388(10053):1545–1602.
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