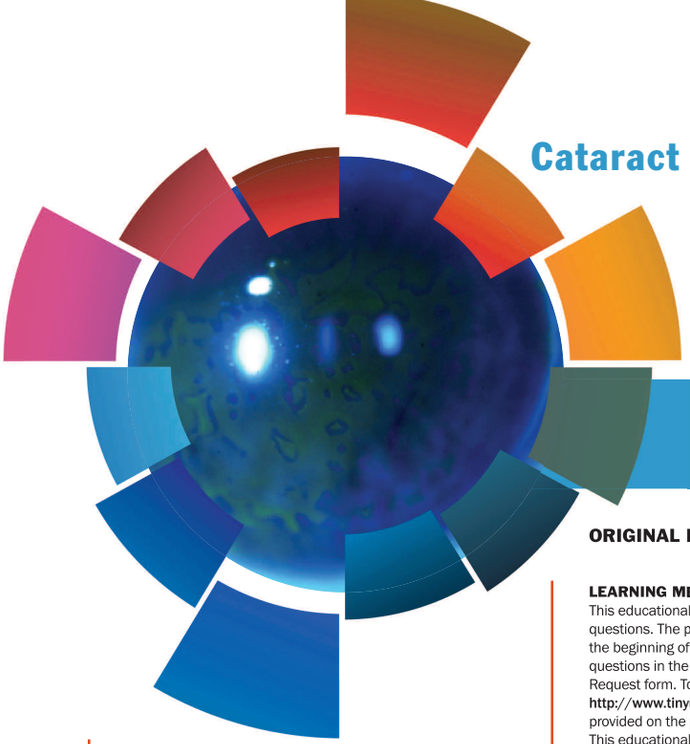

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Cataract Case of the Month CME Series

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CHALLENGING CASES MADE ROUTINE

This Month's Case *Cataract Surgery in a Patient With Epithelial Basement Membrane Dystrophy and Diabetic Macular Edema*

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LEARNING METHOD AND MEDIUM
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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. A host of new tools 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:
- Manage preoperative ocular surface conditions with potential to affect surgical outcomes in patients with cataracts
- Select appropriate medication regimens for suppressing postoperative inflammation and preventing infection in high-risk patients
- Demonstrate optimal IOL selection, knowledge of appropriate refractive targets, and understanding of strategies for achieving intended goals
- Discuss risks and benefits of cataract surgery with patients

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CME Activity

Cataract Surgery in a Patient With Epithelial Basement Membrane Dystrophy and Diabetic Macular Edema

John Sheppard, MD, MMSc; Anthony J. Aldave, MD; Deepinder K. Dhaliwal, MD, LAc; Bonnie An Henderson, MD; Jay S. Pepose, MD, PhD; William B. Trattler, MD

Case from the files of Deepinder K. Dhaliwal, MD, LAc

A 69-year-old woman with a 15-year history of type 2 diabetes, which she admits has been poorly controlled, presents on referral for cataract surgery from her optometrist. She complains of blurred vision and is anxious to have cataract surgery as soon as possible. Noting that her best friend recently had cataract surgery with multifocal intraocular lenses (IOLs), the patient states that she does not want to wear glasses after surgery.

On examination, her best corrected visual acuity (BCVA) is 20/60 OU, and the cornea appears clear on slit-lamp examination (Figure 1). After fluorescein strip instillation and using diffuse blue light, areas of negative staining indicative of epithelial basement membrane dystrophy (EBMD) are seen (Figure 2). Her examination also reveals cortical cataracts in both eyes. Retinal imaging shows mild nonproliferative diabetic retinopathy and clinically significant macular edema (ME). Topography shows irregular astigmatism due to corneal scarring and EBMD (Figure 3).

Although this patient is anxious to proceed with cataract surgery, she needs to be counseled that she has other ocular conditions that need to be addressed first because both her diabetic macular edema (DME) and EBMD are affecting her vision and can be adversely affected by cataract surgery.

DIABETIC MACULAR EDEMA

Patients with diabetes who undergo cataract surgery are at an increased risk for ME and worsening of diabetic retinopathy, and, in particular, the presence of DME immediately prior to cataract surgery is associated with an increased risk of developing center-involving ME.[1,2] This patient needs to be referred to a retina specialist for evaluation and management of her DME.

Anticipating that it may be several weeks until a retina specialist can see her, the cataract surgeon may consider initiating topical anti-inflammatory treatment. Evidence suggests that the topical corticosteroid difluprednate and the topical nonsteroidal anti-inflammatory drugs (NSAIDs) bromfenac and nepafenac may effectively treat posterior segment inflammation and even improve DME.[3-5] Considering the potential for corneal toxicity with NSAIDs, particularly in the setting of a compromised epithelium, 1 of the newer NSAID products formulated for once-daily use, bromfenac, 0.07%, or nepafenac, 0.3%, might be preferred for minimizing corneal exposure to both an NSAID and preservative.

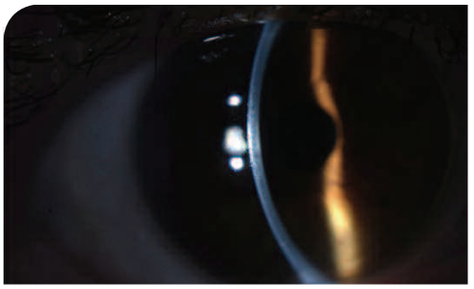

Figure 1. Relatively clear cornea is seen with slit beam

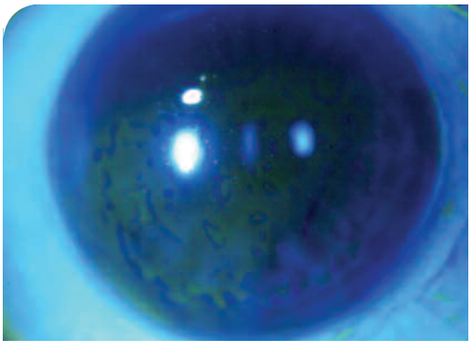

Figure 2. After instillation of fluorescein with a strip, extensive EBMD changes are seen with cobalt blue light

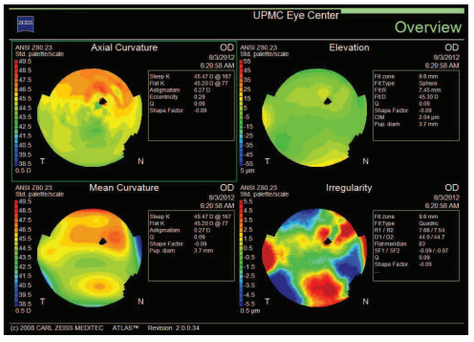

Figure 3. Corneal topography shows irregular astigmatism due to corneal scarring and EBMD

Images Courtesy of Deepinder K. Dhaliwal, MD, LAc

Controlling inflammation after cataract surgery. Considering their risk for developing ME after cataract surgery, patients with DME should receive more intensive anti-inflammatory treatment. In Europe, nepafenac, 0.1%, is approved to prevent ME after cataract surgery in eyes of patients with diabetes.[6] In a randomized, vehicle-controlled trial enrolling patients with nonproliferative diabetic retinopathy, the rate of postsurgical ME was 3.2% in patients treated with nepafenac, 0.1%, vs 16.7% in the control group ($P < .001$).[7]

The pivotal MEAD study also provided evidence that patients implanted with the dexamethasone implant for the treatment of DME were protected from macular thickening after cataract surgery.[8] In addition, a post hoc analysis of data from the pivotal FAME study suggested the fluocinolone acetonide implant protected macular function in eyes with DME undergoing cataract surgery.[9]

However, no guidelines support the use of any specific anti-inflammatory agent or regimen for controlling inflammation after cataract surgery in patients with diabetes. Some surgeons may start a topical NSAID 1 week prior to surgery and continue it postoperatively for 6 to 12 weeks or even longer, depending on the appearance of the macula at serial follow-up visits. Topical corticosteroid treatment might be continued for 1 month prior to tapering, but with close monitoring of intraocular pressure (IOP). Loteprednol etabonate or fluorometholone might be considered in anyone with a history of a steroid-induced IOP response because these 2 products are associated with a lower risk of IOP elevation compared with other ophthalmic corticosteroids.[10,11] Considering that treatment adherence is critical, however, medication affordability should also be considered when choosing anti-inflammatory therapy.

IOL considerations. Although this patient seeks spectacle independence after cataract surgery and some newer multifocal IOLs featuring novel optic designs have reduced the potential for decreasing contrast sensitivity, a multifocal IOL is generally not a good choice for patients who are already suffering from contrast loss because of macular dysfunction.[12] In addition, a multifocal IOL can compromise the view of the operating surgeon should the patient need vitrectomy in the future.[12]

Anti-infective Agents for Preventing Postcataract Surgery Endophthalmitis

Deepinder K. Dhaliwal, MD, LAc

Endophthalmitis after cataract surgery is a rare but potentially devastating infection. Recent studies analyzing Medicare claims data reported a rate of 0.63 to 1.33 per 1000 surgeries, with a final visual acuity of 20/200 or worse in 34% of affected eyes.[1-3]

Gram-positive bacteria, particularly coagulase-negative staphylococci, were the most common isolates in these infections.[1] Antimicrobial prophylaxis should, however, provide broad-spectrum coverage and particularly address methicillin-resistant *Staphylococcus* species, considering the high rate of ocular surface/periocular colonization with these bacteria in the cataract surgery population as well as evidence of an increasing prevalence of postoperative methicillin-resistant *Staphylococcus aureus* (MRSA) infections.[4,5]

Preoperative disinfection of the periocular surface (cornea, conjunctival sac, and periorbital skin) using povidone-iodine represents the standard of care as a strategy for preventing postcataract surgery endophthalmitis.[6,7] There is evidence-based support for its use and also for intracameral cefuroxime.[5-7] The absence of a commercially available product approved for an intracameral injection limits the use of intracameral antibiotics in the United States. Some surgeons are using intracameral antibiotics off-label. Authors of a recent review of the peer-reviewed literature concluded published information generally supports the safety of using intracameral preparations of vancomycin, moxifloxacin, and several cephalosporins, although they noted the potential for dosing errors and compounding risks.[8] In addition, there are concerning reports of a possible association between intracameral vancomycin use and the development of occlusive retinal vasculitis.[9,10]

Scientific rationale and evidence from retrospective studies support the use of topical antibiotics for endophthalmitis prophylaxis, which represents the most commonly used method of administration for antibiotic prophylaxis in the United States.[6,11] Fourth-generation fluoroquinolones are the most widely used because they provide broad-spectrum antibacterial activity against both gram-positive and gram-negative microorganisms and have excellent ocular penetration.[8]

A shift toward increasing use of earlier-generation fluoroquinolones (eg, ciprofloxacin and ofloxacin) has been reported.[11] This pattern represents a concerning trend, considering recent data from the ARMOR (Antibiotic Resistance Monitoring in Ocular Microorganisms) surveillance study in the United States showing approximately 55% of methicillin-resistant coagulase-negative *Staphylococcus* isolates and approximately 75% of MRSA isolates were resistant to those agents.[12] Eventually, some American surgeons may move closer toward the European practice of intracameral antibiotic injection,[13] and additional data are accumulating to support the use of an immediate postoperative intravitreal antibiotic injection.[14] Meticulous attention to preoperative antiseptic use, careful draping, and ensuring all cataract wounds are truly self-sealing will continue to remain important elements to decrease infection risk.

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Macular pathology does not necessarily preclude the use of a monofocal toric IOL, but in this situation, patients need to be counseled on the potential for needing spectacle correction should their vision deteriorate in the future because of worsening of their retinal disease. Although the patient in this case had a +2 D cylinder at initial examination, her astigmatism will need to be reevaluated after she is treated for EBMD. A toric IOL can then be considered if stable topography shows significant regular astigmatism.

Elevation of the macula can induce a hyperopic shift by reducing the effective axial length. When determining IOL power in an eye prone to recurrent ME, therefore, the target refraction should aim for slight myopia. A hydrophobic acrylic lens is a better choice than a silicone lens in a case in which retinal surgery may be needed in the future.

EPITHELIAL BASEMENT MEMBRANE DYSTROPHY

Diagnosis and treatment. Also known as anterior basement membrane dystrophy or map-dot fingerprint dystrophy, EBMD is important to identify prior to cataract surgery because it can create irregular astigmatism, lead to IOL calculation errors, and create patient dissatisfaction with postoperative vision.

As seen in this case, signs of EBMD can be subtle and overlooked on routine examination. Use of retroillumination or blue light can enable detection. Areas of negative staining after fluorescein instillation are consistent with EBMD. A wet fluorescein strip can highlight the staining. If drops are used, removing excess fluorescein from the tear film can enable visualization of subtle negative staining. The combination of fluorescein and anesthetic drops may result in a thicker film that masks negative staining, and then the diagnosis can be missed.

Treatment for EBMD prior to cataract surgery depends on its severity and whether it is significantly affecting vision. Topography should be performed to assess the extent of corneal irregularity in any patient with EBMD involving the central 5 mm of the cornea. Peripheral epithelial irregularity associated with EBMD is not as likely to affect vision or central keratometry. If several reliable methods provide concordant keratometry results, it would be generally acceptable to proceed with cataract surgery using the measured value.

Medical treatment, which can include lubrication, a topical hyperosmotic, oral doxycycline, and a topical corticosteroid, may be undertaken to stabilize the corneal surface. If the patient wants to consider a toric IOL, however, surgical treatment is indicated prior to cataract surgery so the correct amount of astigmatism will be manifest and measured.

Surgical options for treating diffuse EBMD include epithelial debridement with or without diamond burr polishing of the Bowman membrane as well as phototherapeutic keratectomy (PTK). An analysis of 36 eyes with visually significant EBMD showed epithelial debridement with diamond burr polishing resulted in significant improvements in corrected distance visual acuity and mean topographic astigmatism.[13] Furthermore, among the 22 eyes followed for at least 3 months (mean, 32 months; maximum, 11.5 years), there were no cases of EBMD recurrence. Among eyes with a follow-up of at least 1 month, 9.4% had surgically induced subepithelial haze at the last follow-up. However, no eyes had loss of BCVA because of the haze.

The potential for poor healing after epithelial debridement is a particular concern in this patient with diabetes. Pretreatment assessment of blink rate and corneal sensation is important to identify hypesthetic eyes that are at risk for delayed healing.

Given the potential for infection after epithelial debridement, surgery for EBMD should be avoided in patients anticipated to be poorly compliant with scheduled follow-up visits. Another issue to consider when undertaking PTK or epithelial debridement for EBMD is the risk for herpes simplex virus (HSV) reactivation in patients with a history of ocular herpes. Therefore, eliciting a history of HSV and initiating antiviral prophylaxis when appropriate are important. Highly unilateral EBMD and the presence of subepithelial scarring suggest a herpetic etiology. Topical corticosteroids used after epithelial debridement or cataract surgery itself can also promote HSV reactivation.

Cataract surgery considerations. The *Cataract Case of the Month* faculty vary with respect to how long they wait after treating EBMD before obtaining a keratometry measurement for IOL calculation. Approaches include waiting anywhere from 4 to 8 weeks. Looking for consistency between repeat measurements taken at an interval of 3 to 4 weeks is also recommended.

Regarding sequencing, cataract surgery can be performed without first treating the EBMD if a monofocal nontoric IOL is being considered and as long as patients are aware that the corneal condition may still compromise vision, but can be addressed later if they so desire. Clinical experience shows that patients often decline further treatment because they are satisfied with their vision improvement after cataract surgery and prefer not to have yet another procedure. This approach may also be considered when there is concern about healing after epithelial debridement, such as in patients with diabetes or significant ocular surface toxicity from chronic glaucoma medication use. Performing cataract surgery alone without ocular surface surgery is also reasonable if the EBMD is mild and the cataract is considered to be the primary cause of reduced vision. Primary treatment of the EBMD should be strongly considered in patients with diabetes in whom the risks of infection and inflammation are elevated and particularly because a slower healing period is anticipated. EBMD complications after cataract surgery present numerous clinical, fiscal, psychological, and prognostic challenges best remedied sequentially rather than simultaneously to cataract surgery recovery.

If cataract surgery is performed without treating the EBMD, the refractive target should be for slight myopia. This approach will allow for the slight hyperopic shift that can occur if the EBMD is subsequently treated with PTK. It should also be recognized and discussed with patients that the trauma of cataract surgery can cause worsening of mild EBMD to the point at which it becomes visually significant. The epithelial irregularity that develops in those cases usually resolves after cataract surgery, but not always. Thus, preemptive epithelial debridement prior to cataract extraction is the treatment of choice for many cataract surgeons, particularly those with corneal training and a higher degree of comfort with corneal procedures.

Studies evaluating whether or not diabetes affects the risks of colonization with methicillin-resistant *Staphylococcus* or endophthalmitis after cataract surgery have generated mixed results.[14-16] The Endophthalmitis Vitrectomy Study found that patients with diabetes were significantly more likely to have culture-positive endophthalmitis and a poor vision outcome after endophthalmitis compared with those without diabetes.[17] Regardless, endophthalmitis prophylaxis is a critical component in the management of all cataract surgery patients ***[see Sidebar: Anti-infective Agents for Preventing Postcataract Surgery Endophthalmitis]***.

SUMMARY

Active DME and the presence of EBMD affecting the central cornea affected visual acuity in this patient. Cataract surgery should be deferred until these conditions are addressed, and then visual acuity should be reassessed to determine if the cataracts are still visually significant. This strategy enables sequential analysis of potential posttherapeutic complications, which are high in this group of patients, as well as superior biometry accuracy and a more satisfactory postcataract outcome.

A thorough discussion is mandatory to properly educate the patient and manage expectations. If cataract surgery is needed, it should only be performed after comprehensive counseling on the risks pertaining to the corneal and retinal disease to achieve informed consent. In addition, recommendations for this patient include preoperative and postoperative anti-inflammatory treatment to limit postoperative ME and a monofocal IOL rather than a multifocal IOL to optimize visual quality after cataract surgery.

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