Repair of Descemet Membrane Detachments With the Assistance of Anterior Segment Optical Coherence Tomography

Extensive Descemet membrane detachment (DMD) is a rare complication of intraocular surgery that can lead to corneal decompensation. Although DMD may resolve spontaneously, surgical repair is frequently required. The diagnosis may be difficult because corneal edema can obscure visualization of the Descemet membrane (DM). Ultrasonographic biomicroscopy (UBM) has been the standard for imaging DMD in patients with corneal opacity. Anterior segment optical coherence tomography (OCT) is a new technique for imaging anterior segment anatomy to evaluate narrow angles, flaps created with laser-assisted in situ keratomileusis, and corneas after DM-stripping automated endothelial keratoplasty. We report 2 cases of extensive DMD in which both UBM (model P45 ultrasonographic biomicroscope; Paradigm Medical, Inc, Salt Lake City, Utah; VuMax ultrasonographic biomicroscope; Sonomed, Inc, Lake Success, New York) and anterior segment OCT (Visante optical coherence tomograph; Carl Zeiss Meditec, Inc, Dublin, California) were used to image the DMD before surgical repair.

Report of Cases. Case 1. A 73-year-old man underwent cataract extraction via phacoemulsification with a temporal clear corneal incision. He had a history of tamsulosin hydrochloride (Flomax) use, and iris hooks were placed to manage intraoperative floppy iris syndrome. On postoperative day 1, visual acuity was 20/40; however, within 24 hours, visual acuity decreased to 20/400 and substantial corneal edema had developed. There were no signs of intraocular infection, and combined treatment with prednisolone acetate, 1%, and a sodium chloride solution, 5%, was started. The patient’s condition did not improve during the next 2 weeks, and he was referred to our institution for evaluation of possible pseudophakic bulbar keratopathy. Visual acuity was still 20/400, without an afferent pupillary defect. Intraocular pressure was normal. Slitlamp examination revealed quiet conjunctiva and diffuse corneal edema with a quiltlike pattern of deep stromal folds (Figure, A). Through the hazy view, there was the suggestion of a large DMD. The remainder of the ophthalmologic examination yielded unremarkable findings. The patient underwent both UBM (Figure, B) and anterior segment OCT (Figure, C), which confirmed a large, planar, nonscrolled DMD involving almost the entire cornea. After an initial intracameral injection of sulfur hexafluoride, 20%, failed to enable reattachment of the DM, a second, larger injection of sulfur hexafluoride, 20%, was administered. One month postoperatively, there was complete resolution of the DMD (Figure, D) and visual acuity was 20/30.

Case 2. A 90-year-old woman underwent cataract surgery via phacoemulsification. At the end of the procedure, the surgeon discovered a large DMD and injected filtered air into the anterior chamber in an attempt to tamponade the DM against the corneal stroma. On postoperative day 1, the air bubble had been absorbed but the DM remained detached, with substantial corneal edema. After combined treatment with prednisolone acetate, 1%, and sodium chloride, 5%, for 1 month, the patient was referred to our institution for repair of the DMD. Visual acuity was 20/400. Pupil reactivity was normal, as were results of tonometry. Slitlamp examination revealed a large, central, nonplanar DMD with a slightly scrolled temporal edge (Figure, G) and diffuse corneal edema with deep stromal folds in a quiltlike pattern (Figure, E). The remainder of the examination yielded unremarkable findings. The patient underwent UBM (Figure, F) and anterior segment OCT (Figure, G) before repair of the DMD, with injection of octafluoropropane, 14%, into the anterior chamber. One month after surgery, the DMD had completely resolved (Figure, H) and visual acuity was 20/50.

Comment. Although small, localized DMDs are commonly seen in modern cataract surgery, large detachments are rare and can be visually devastating. Mechanisms such as engaging the DM with the irrigation-aspiration probe, mechanically stripping the DM with the intraocular lens during implantation, and inadvertently injecting viscoelastic between the DM and the stroma have been proposed. Kansal and Sugar suggest that some patients, especially those with bilateral DMD after surgery, may have abnormalities of the fibrillar bundles of collagen that attach the DM to the posterior stroma.

To aid in prognosis, DMD can be classified as planar (<1 mm separating the DM from stroma) or nonplanar (≥1 mm separating the DM from stroma), with scrolled or nonscrolled edges. Planar, nonscrolled DMD has the best prognosis for spontaneous resolution, whereas nonplanar or scrolled DMD typically requires surgical correction. Although DMD may spontaneously reattach within weeks to months, many authors advocate early surgery to prevent fibrosis that can be associated with longstanding corneal edema. Options include manual repositioning; suturing of the DM to the peripheral...
cornea; or mechanical tamponade with an intracameral injection of air, sulfur hexafluoride, octafluoropropane, or viscoelastic.\textsuperscript{1,2,4,5} Injection of isoexpansile sulfur hexafluoride, 20%, or octafluoropropane, 14%, may be preferable in most cases because air often reabsorbs before the DM is reattached and viscoelastics can cause prolonged intraocular pressure elevation.\textsuperscript{5} In addition, this procedure can be performed at the slitlamp and may be repeated if necessary.

As in case 1, diffuse corneal edema can obscure the slitlamp view into the anterior chamber, making the diagnosis and subsequent surgical planning difficult. Ultrasonographic biomicroscopy has been advocated as a means of imaging DMD through an opaque cornea, but this procedure requires a skilled technician, a cooperative patient, and substantial time investment.\textsuperscript{2} Anterior segment OCT may be a superior alternative to UBM because of the speed and ease of image acquisition, the ability to acquire images without direct corneal contact, and the ability to image patients in the upright position.\textsuperscript{3} Optical coherence tomography provides higher-resolution images (18 µm with Visante OCT vs 20-50 µm with UBM) and can accommodate mul-

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\caption{Patients 1 and 2, respectively. A and E, Slitlamp view shows diffuse corneal edema in a quiltlike pattern. B and F, Horizontal ultrasonographic biomicroscopic image through the central cornea demonstrates a large central Descemet membrane detachment. C and G, Corresponding horizontal image obtained with anterior segment optical coherence tomography before repair. D and H, Horizontal anterior segment optical coherence tomographic image obtained 6 months after repair demonstrates complete resolution of the Descemet membrane detachment.}
\end{figure}
ample of incidence to the tissue, whereas UBM gives the best reflectance and, therefore, signal when the tissue planes are perpendicular to the sound energy. Optical coherence tomography may be of particular benefit in the early postoperative period because it does not require immersion of the eye in solution and thus reduces the risk of infection. In our series, the image quality of the anterior segment with OCT was clearly superior to that with UBM. In our experience, anterior segment OCT was also helpful in determining areas of peripheral anterior segment OCT was also helpful with UBM. In our experience, anterior segment OCT was also helpful in determining areas of peripheral anterior segment OCT was also helpful with UBM. In our experience, anterior segment OCT was also helpful in determining areas of peripheral.

In summary, DMD as a cause of severe corneal edema after cataract surgery can be difficult to diagnose. The noncontact, high-resolution imaging provided by anterior segment OCT enables improved visualization that can aid in better diagnosis and optimal surgical planning.

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Gastrointestinal Adverse Effects of Prostaglandin Analogues

Prostaglandin analogues are the first choice of treatment for glaucoma in part because of their limited systemic adverse effects. Only the Travatan (Alcon Laboratories Inc, Fort Worth, Texas) (travoprost ophthalmic solution, 0.004%) label lists gastrointestinal adverse effects, noting dyspepsia and gastrointestinal disorders at a rate of 1% to 5%. Neither Xalatan (Pfizer Inc, New York) (latanoprost ophthalmic solution, 0.005% [50 µg/mL]) nor Lumigan (Allergan Inc, Irvine, California) (bimatoprost ophthalmic solution, 0.03% [0.3 mg/mL]) lists any gastrointestinal adverse effects on their labels.

Prostaglandin analogues have a favorable systemic adverse effect profile, with rare reports of discontinuation of treatment secondary to adverse events. We describe 3 patients with transient gastrointestinal adverse effects after prostaglandin analogue use. The adverse effects in all 3 patients were confirmed by means of unmasked challenge-rechallenge tests, and all 3 patients were tested with at least 2 prostaglandin analogues. The adverse effects were different for each of the 3 patients, and severity differed depending on which medication was used.

Report of Cases. Case 1. A 59-year-old male university professor with ucular hypertension and a medical history of intermittent mild heartburn (now resolved) had acute gastrointestinal distress 30 minutes after taking latanoprost, despite proper punctal occlusion. He reported nausea, lightheadedness, and substernal fluttering lasting a few seconds, which occurred every 5 to 10 minutes for approximately an hour. He noted gastric reflux up to 12 hours after ingestion, constipation, bloating, and generalized malaise. These symptoms occurred for the next 4 days after latanoprost use and rapidly resolved after discontinuation of the drug. Two more unmasked rechallenges resulted in similar symptoms, followed by rapid resolution after discontinuation. After a 2-month drug-free period, he was challenged (unmasked) with bimatoprost and reported similar complaints with more severe substernal fluttering and a butterfly rash on his face. The substernal flutter was diagnosed as an esophageal spasm by his gastroenterologist, who could not determine the cause. Cardiac and endocrine origins of the symptoms were ruled out during visits to an emergency department and then an endocrinologist.

Case 2. A 60-year-old sculptor with juvenile open-angle glaucoma was given latanoprost. He self-discontinued using the drug because of “aspirin-like side effects,” despite punctal occlusion. He described the adverse effects as a severe gastric burning sensation, acid reflux, and an acidic aftertaste in his mouth, unrelieved by taking antacids. He also noted sinus congestion and neck muscle tension. The patient reported a history of minor heartburn readily relieved by taking antacids. The symptoms resolved within 2 days of discontinuation of the drug. Unmasked rechallenges with all 3 available prostaglandin analogues resulted in the same symptoms, which resolved on discontinuation of drug use.

Case 3. An 84-year-old woman with normal-tension glaucoma was given latanoprost, and she self-discontinued using it after developing dizziness, nausea, and vomiting. The symptoms improved after discontinuation, and an unmasked rechallenge resulted in the same complaints, with resolution on discontinuation of drug use. She was later challenged with travoprost and bimatoprost and experienced similar adverse effects with both; in both cases, the symptoms were relieved by drug discontinuation.

Comment. All 3 patients had severe gastrointestinal adverse effects after initiating treatment with prostaglandin analogues. The first patient developed esophageal spasm, regurgitation, constipation, and generalized malaise. The second patient noted a burning sensation in his stomach, heartburn, and an acidic aftertaste. The third patient developed nausea, vomiting, and dizziness. The adverse effects in all 3 patients were con-