What Corneal Specialists Want You to Know

Pearls to keep the cornea healthy and your patients happy after cataract or refractive surgery.

BY DEREK W. DELMONTE, MD

As patients increasingly expect visual acuities of 20/20 after cataract and refractive surgery, you must become more familiar with the entire optical system of the eye—not just the part on which you are focused. From the tear film through the cornea and lens and finally to the retinal surface, every component is critical to our goals and must be accounted for in our preoperative planning and surgical execution. As a cornea specialist, I often field questions from my cataract and refractive colleagues who wish to ensure the best optical results for their patients by optimizing the health of their corneas. Herein are the top 12 ways to ensure a healthy cornea and a happy patient!

No. 1. IDENTIFY AND TREAT OCULAR SURFACE DISEASE BEFORE SURGERY TO MAXIMIZE OUTCOMES

Both dry eye disease and blepharitis impart significant morbidity to refractive and cataract surgery patients, making it imperative that you treat these conditions preoperatively to achieve the best outcomes. Educating patients on the importance of lubricating regimens is only half the battle; controlling the underlying inflammatory components of these conditions remains key. Daily eyelid hygiene and the judicious use of topical antiinflammatory medications such as steroids and cyclosporine 0.05% (Restasis; Allergan) for up to 8 weeks before surgery will improve the quality of the tear film as well as patients' symptoms. Consider adding supplementation with omega-3 fatty acids.

No. 2. TOPICAL MEDICATIONS CAN HAVE A HUGE IMPACT ON THE CORNEA

One of the most overlooked aspects of corneal dysfunction is that of medicamentosa or ocular surface toxicity from topically applied medications. Many topical medications are toxic to the cornea in high doses, and many of those that are not contain preservatives that can irritate and compromise the quality of the ocular surface. For example, topical carbonic anhydrase inhibitors such as dorzolamide and brinzolamide are well known for exacerbating corneal edema in patients with underlying endothelial dysfunction. In some cases, simply stopping treatment with the agent can avert the need for endothelial transplantation. Common preservatives such as benzalkonium chloride are also known to cause corneal irritation and refractive disruption in patients frequently using topical medications for glaucoma and other chronic conditions. I will often take the time to switch patients to preservative-free alternatives before considering more invasive options to treat corneal dysfunction.

No. 3. CONSIDER PERIOPERATIVE ANTIVIRAL PROPHYLAXIS FOR PATIENTS WITH A HISTORY OF HERPETIC KERATITIS

Because there is an increased risk of herpetic keratitis reactivation at the time of refractive or cataract surgery, it is advisable to prophylactically treat many of these patients perioperatively. Consider administering a prophylactic dose of oral acyclovir (400 mg b.i.d.), valacyclovir (500 mg daily), or famciclovir (250 mg b.i.d.). Treatment should begin up to 3 days before and contin-

ue for up to 1 month after surgery or for as long as high-dose topical steroids are used. You may wish to consider renal dosing for patients with kidney dysfunction.

No. 4. BE WARY OF IRREGULAR OR UNSTABLE KERATOMETRY VALUES

Keratometry (K) values that appear highly irregular, change over a short period of time, or simply do not make sense will likely have a large impact on refractive outcomes. Although ocular surface conditions such as dry eye disease are often the cause, there are many other possibilities to consider. Three of the more common etiologies include anterior basement membrane dystrophy, pterygium, and Salzmann nodules. All of these conditions alter the shape of the refractive surface of the eye and are variable enough to lead to unstable—and ultimately less desirable—outcomes. Although a pterygium is obvious on examination, its impact on biometric measurements is often less so. In contrast, anterior basement membrane dystrophy and Salzmann nodules may be difficult to identify on cursory examination. Sodium fluorescein staining will help identify the location of the surface irregularity, and obtaining a topographic map will show the extent of the impact. I often recommend removing the offending pathology and waiting up to 6 months, or until the K values stabilize, before proceeding with cataract or refractive surgery.

No. 5. WHEN K VALUES DIFFER BETWEEN MEASUREMENT MODALITIES

When K values differ between measurement modalities, it is often difficult to determine which to trust, particularly when the surgical correction of astigmatism is planned. Assuming all values are reliable, regular, and reproducible (separating this from the previously mentioned issues), it is important to understand how each modality obtains these numbers to select the best values for your needs. Manual K directly measures curvature values at a few select locations around the cornea, as do many autokeratometers, making them some of the most reliable measures of astigmatism but less dependable for identifying the exact axis of highest astigmatism. Topography, on the other hand, is very good at identifying the axis of highest astigmatism due to more "whole cornea" measurements, although in my experience the device's simulated K values are sometimes less accurate. I therefore generally use the K values from an autokeratometer such as the IOLMaster (Carl Zeiss Meditec) but the axis from a topographic map for toric lens calculations in cases of disagreement. If I am still not comfortable due to the degree of disagreement, I will not consider permanent correction until I have repeated all of the measurements.

NO. 6. THE IMPORTANCE OF POSTERIOR CORNEAL CURVATURE ON IOL CALCULATIONS

A relatively new and controversial topic is the impact of the posterior corneal curvature on IOL selection. Although there is still little consensus on its exact effect, new imaging modalities are able to measure the posterior curvature, which most certainly accounts for some of the refractive inaccuracy surgeons have experienced with cataract surgery.

This may be particularly important in toric lens alignment.[1] As a general guideline, I have reduced the toric power by about 0.25 D in patients who have with-the-rule corneal stigmatism, but I fully correct those with against-the-rule astigmatism. My approach differs slightly from what Douglas Koch, MD, has recently recommended: he adds power for against-the-rule cylinder.[2] Although my "quick-and-dirty" method has slightly improved my results, new IOL power calculations will likely take measured posterior corneal curvature into account and, I hope, improve predictive refractive outcomes.

No. 7. WHEN TO AVOID TORIC LENSES IN PATIENTS WITH MEASURED ASTIGMATISM

Toric IOLs represent a huge advance in refractive cataract surgery, but there are times when their use should be avoided. Unstable biometry or patients with conflicting astigmatic values suggesting a significant lenticular component (refractive astigmatism that is not mirrored in the K values) are red flags. In addition, patients with highly irregular or progressive astigmatism are not candidates. I also prefer to avoid these lenses in patients who may require future corneal transplantation (either partial or full thickness), because the IOLs will significantly complicate the refractive goals. The last group includes patients with progressive corneal dystrophies such as Fuchs endothelial dystrophy or lattice corneal dystrophy. Finally, I avoid toric IOLs in rigid contact lens wearers.

No. 8. IDENTIFY AND PLAN FOR FUTURE CORNEAL SURGERY

Although not every patient with Fuchs corneal dystrophy will require corneal surgery at the time of cataract surgery, it is prudent to consider who is at high risk of needing future surgical intervention. In these patients, choosing the appropriate refractive goal can improve long-term outcomes. Descemet stripping endothelial keratoplasty (DSEK) has been shown to impart a hyperopic shift of between 0.25 and 2.00 D.[3] A slightly myopic goal after the cataract extraction can thus get the patient closer to emmetropia after a future DSEK. Much

depends on how imminent the risk is for corneal decompensation, but ultimately, nothing is more important than a thorough conversation with the patient about these concerns.

No. 9. A DSEK TRIPLE OR CATARACT SURGERY ALONE?

It is often difficult to know when you can perform a cataract extraction alone and when it is more prudent to refer a patient for a combined procedure. Previous studies have suggested using pachymetry as the primary indicator, with 640 µm as the upper limit of considering cataract surgery alone.[4] This is a good screening technique for those at high risk, but I have found it less helpful than a simple review of the patient's symptoms. Patients with a diurnal fluctuation in vision consisting of blurry vision in the morning that clears later in the day will benefit from a combined procedure no matter what their pachymetry value. Additionally, I have found that those who complain of extreme glare with night driving or in bright sunlight who have confluent corneal guttae will also likely benefit from a combined procedure. In all cases, taking the time to educate your patients on their prolonged recovery can save frustration postoperatively.

No. 10. IDENTIFY AND TREAT CORNEAL BURNS AT THE TIME OF SURGERY

Although improvements in technology have decreased the total energy demands of cataract surgery, wound burns still occur, often due to prolonged occlusion of the aspiration port or a lack of irrigation. Quick identification is important. Signs include a progressive whitening around the corneal incision with increasing rigidity and leakage of the wound. You may also notice a buildup of lens "dust" around the phaco tip and repeatedly hear an occlusion "warning bell" even though the phaco tip appears to be open. An immediate pause in surgery to check the irrigation and aspiration functions of the handpiece is critical and will prevent further damage. Once surgery is complete, suture the wound closed, because its increased rigidity and contracture will often lead to persistent leakage and risk hypotony and endophthalmitis. Future treatment of astigmatism due to localized contracture of the cornea may also be necessary.

No. 11. RECOGNIZE AN INTRAOCULAR DESCEMET DETACHMENT

Although a rare complication of intraocular surgery, a Descemet membrane detachment can be devastating for both the patient and the surgeon. I have found that early detection and immediate corrective measures can help lessen the visual impact. A detachment will often begin at the site of the main wound, and repeatedly entering and exiting the incision will increase the risk of detachment. When you first notice a small flap of Descemet membrane, decreasing anterior chamber flow and frequently instilling a dispersive ophthalmic viscosurgical device will often keep the detachment from propagating. If the flap remains small, this step may be all that is necessary. If the detachment begins to enlarge, placing a small air bubble in the anterior chamber at the completion of the case will help the flap reattach in the immediate postoperative period. Patients should be warned that their vision will be quite poor postoperatively if an air bubble has been placed in the anterior chamber.

No. 12. SURGERY ON A POSTKERATOPLASTY PATIENT

When performing surgery (refractive or cataract) on a patient with a corneal transplant, I recommend a few steps to improve visual outcomes and ensure the continued health of the graft. First, I perform serial optical biometry measurements, including K, to ensure a stable refractive state. This is particularly important with full-thickness grafts that can often produce large refractive shifts in the immediate postoperative period. I also like to selectively remove as many sutures as possible to achieve a total astigmatism of less than 2.00 D before considering any intervention. Once optical biometry appears stable, I perform intraocular surgery with minimal phaco energy and protect the endothelium with frequent instillation of an ophthalmic viscosurgical device, including the use of a dispersive viscoelastic. I construct my wound as far from the graft-host interface as possible and will consider a scleral tunnel incision with large grafts. I will always place a 10–0 nylon suture to ensure adequate closure postoperatively. Increasing your standard postoperative steroid regimen to six to eight times daily for the first week can also be helpful.

I hope these pearls bring you much success with your corneal patients. ■

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1. Koch DD, Ali SF, Weikert MP, et al. Contribution of posterior corneal astigmatism to total corneal astigmatism. *J Cataract Refract Surg*. 2012;38(12):2080-2087.
2. Koch DD, Jenkins RB, Weikert MP, et al. Correcting astigmatism with toric intraocular lenses: effect of posterior corneal astigmatism. *J Cataract Refract Surg*. 2013;39(12):1803-1809.
3. Scorcia V, Matteoni S, Scorcia GB, et al. Pentacam assessment of posterior lamellar grafts to explain hyperopization after Descemet's stripping automated endothelial keratoplasty. *Ophthalmology*. 2009;116(9):1651-1655.
4. Seitzman GD, Gottsch JD, Stark WJ. Cataract surgery in patients with Fuchs' corneal dystrophy: expanding recommendations for cataract surgery without simultaneous keratoplasty. *Ophthalmology*. 2005;112(3):441-446.