

OPTIMIZING OCULAR SURFACE HEALTH TO IMPROVE CATARACT SURGERY OUTCOMES



Pre- and postoperative strategies.

BY CAROLINE WATSON, MD

A substantial percentage of cataract surgery candidates present with undiagnosed ocular surface disease (OSD), which can have a significant impact on surgical outcomes if unmanaged. The procedure itself can exacerbate OSD symptoms by disrupting the ocular surface and destabilizing the tear film. Proactive management of OSD, both before and after surgery, is therefore critical for enhancing refractive outcomes and improving patients' quality of life.^{1,2}

FUNDAMENTAL 1 PREOPERATIVE MEASUREMENTS

Optimal visual outcomes depend on accurate preoperative measurements to guide IOL selection. However, obtaining reliable biometry, topography, tomography, and keratometry (K) measurements can be challenging in patients with tear film instability and other OSD-related abnormalities. Studies have shown substantial variations in these measurements before and after the treatment of OSD.³⁻⁵

Conditions such as dry eye disease (DED) can progress into chronic forms of OSD such as epithelial basement membrane dystrophy (EBMD), Salzmann nodular degeneration, and pterygium, which can destabilize the tear film, induce irregular

astigmatism, and increase higher-order aberrations. For example, a prospective observational study found greater variability in K readings among patients with elevated tear osmolarity, leading to differences in IOL power calculations.⁶

Patients with EBMD may experience recurrent corneal erosions and develop a thickened basement membrane, which, if untreated, can cause irregular astigmatism and lead to postoperative refractive errors. Similarly, Salzmann nodular degeneration presents with nodular formations on the anterior cornea that disrupt both topography and K measurements.¹ Superficial keratectomy and the application of a cryopreserved amniotic membrane (CAM) can improve surface regularity, allowing more accurate measurements. Healing typically requires 6 to 8 weeks, after which stable measurements and predictable refractive outcomes are achievable.^{7,8}

Thermal pulsation treatment for meibomian gland dysfunction (MGD) has also demonstrated benefits in cataract patients. A pilot study involving 25 eyes with MGD showed that preoperative thermal pulsation treatment reduced residual refractive astigmatism, emphasizing the value of tear film stability in enhancing keratometric accuracy and refractive outcomes.⁹

FUNDAMENTAL 2 PREOPERATIVE OCULAR SURFACE OPTIMIZATION

OSD treatment should be tailored to each patient's clinical presentation. Initial conservative measures often include artificial tears, warm compresses such as Bruder masks, and lid hygiene (eg, Eye Revive [Daily Practice], OcuSoft Lid Scrub [OcuSoft]). For more persistent symptoms, targeted therapies can be beneficial.^{1,2}

- *Demodex* blepharitis: Lotilaner ophthalmic solution 0.25% (Xdemvy, Tarsus Pharmaceuticals) is the first US FDA-approved treatment for *Demodex* mites. It can enhance tear film stability and support preoperative ocular health.
- Rosacea and MGD-related DED: Intense pulsed light therapy can be effective for ocular rosacea and MGD. Treatment can reduce inflammation and stabilize the tear film.³
- Corneal irregularities: For patients with EBMD or superficial scarring, superficial keratectomy and CAM application (Prokera, BioTissue) can smooth the cornea, promoting healing before cataract surgery. CAM has been shown to provide a lasting improvement in DED signs and symptoms.^{7,8}
- Pterygium: In cases of pterygium, CAM can support healing and prevent recurrence when used with the tissue-tuck technique.¹⁰

Other therapies, including lifitegrast 5% (Xiidra, Bausch + Lomb) for antiinflammatory effects and autologous serum tears for aqueous-deficient DED, can enhance corneal stability. In eyes with severe neurotrophic keratitis, cenegegermin-bkbj (Oxervate, Dompé) stimulates corneal nerve regeneration. Treatment with corticosteroids and cyclosporine A (Restasis, AbbVie) can reduce inflammation and improve tear production, stabilizing the ocular surface before surgery.^{1,2}

FUNDAMENTAL POSTOPERATIVE CARE

3 OSD symptoms may worsen after cataract surgery, leading to increased patient discomfort and the potential for dissatisfaction. A proactive postoperative approach—including regular ocular surface assessments, appropriate use of lubricants, punctal occlusion, and careful medication management—can help promote healing and minimize the need for additional follow-up visits with patients experiencing discomfort.

Effective postoperative OSD management involves the continued use of lubricating drops to restore moisture and relieve irritation. In certain situations, punctal occlusion may help retain tears and alleviate DED symptoms. Patients with diabetes are particularly vulnerable to DED owing to impaired tear production and ocular surface health. Medications such as antihistamines, diuretics, and treatments for chronic conditions can further destabilize the tear film.¹¹

Antiinflammatory therapies, such as topical corticosteroids, can reduce postoperative inflammation, but close observation is required to avoid adverse effects such as elevated IOP and delayed wound healing.¹¹ Caution with postoperative antibiotics is also advised because prolonged use can exacerbate OSD. Monitoring patients for signs of toxicity or

adverse reactions—such as increased discomfort or worsening DED—is essential to ensure medications do not compound OSD symptoms.

FUNDAMENTAL PATIENT EDUCATION AND MONITORING

4 Educating patients about the importance of ocular surface health before and after cataract surgery is fundamental for successful outcomes. Patients often underestimate the role of the ocular surface in their surgical results, making it essential for providers to communicate how conditions such as DED can affect their recovery. A well-informed patient is more likely to be actively engaged in their care, adhere to prescribed therapy, and experience better surgical outcomes.^{1,2}

Tailored educational materials, such as brochures, videos, and digital resources, should address individual needs by explaining OSD causes, treatment rationales, and maintenance steps. Reinforcing this information during office visits allows patients to ask questions, fostering their understanding and compliance. Emphasizing the importance of proper eyelid hygiene, the use of preservative-free artificial tears, and adherence to prescribed therapy can empower patients to manage their symptoms effectively.

Patient education should continue into the postoperative period. Discussing expected changes in ocular surface health and providing clear instructions for follow-up care help to manage anxiety and encourage proactive recovery management. Patients should be advised to monitor their symptoms and report significant changes to enable timely intervention and prevent complications.

CONCLUSION

Optimizing the ocular surface for cataract surgery requires more

than a checklist of treatments—it demands an integrated approach that recognizes the profound impact of ocular surface health on surgical success. Surgeons must look beyond intraocular techniques and ensure that each patient's ocular surface is stable, healthy, and prepared to support the precision of modern IOL technology. By prioritizing preoperative assessments, personalizing interventions, and educating patients about their role in postoperative care, physicians can address OSD proactively rather than reactively. ■

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