Pre-Surgical Ocular Surface Disease Management in Cataract and Refractive Patients

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Millions of Americans undergo cataract or refractive surgery each year in hopes of achieving clear uncorrected vision.[1,2] While these procedures offer many patients an improved quality of life, one of the most common complaints from patients postoperatively is ocular surface irritation or dryness.[3-6] While there are several risk factors for developing postoperative dry eye, pre-existing undiagnosed and/or untreated preoperative dry eye is common. In the refractive surgery population, 18 to 38% of LASIK patients and 48% of photorefractive keratectomy patients report preoperative dry eye symptoms.[7-9] In the cataract surgery population, the prevalence of preoperative dry eye varies widely depending on the diagnosis criteria. Based on traditional diagnostic tests, Trattler et al reported that 18% of patients have an abnormal Schirmer's score, 63% have decreased tear breakup time (≤ 5 seconds), and 77% have corneal staining.[10] In relation to meibomian gland dysfunction (MGD), Cochener et al reported that 54% of patients had poor meibomian gland expression and 56% of patients had gland atrophy.[11] Finally, with respect to ocular surface inflammation, Gupta et al reported that 56.7% had abnormal tear osmolarity and 63.3% tested positive for matrix metalloproteinase (MMP-9), while 40% were positive for both tests.[12] Interestingly, among asymptomatic patients, 71% had compromised gland function or morphology, and 48% had abnormal tear osmolarity and tested positive for MMP-9.[11,12] Unfortunately, many of these asymptomatic patients often go undiagnosed and untreated in a preoperative workup.

TEAR FILM IMPACT ON BIOMETRY MEASUREMENTS

A stable tear film is important for optimizing preoperative biometry measurements. Some of these instruments rely on light projections and reflections off of the tear film.[13] Because the air-tear interface contributes to the eye's refractive power, an unstable tear film typical of a dry eye patient can produce variable biometry measurements compared to healthy eyes.[14]

Epitropoulos et al found significantly more variability in average keratometry, and anterior corneal astigmatism was observed in hyperosmolar patients (> 316 mOsm/L in at least one eye) compared to normal patients (< 308 mOsm/L in both eyes) ($P = .05$), with significant resultant differences in IOL power calculations ($P = .02$).[15] The authors suggest that measurement of tear osmolarity at the time of cataract surgery planning can effectively identify patients with a greater risk of high unexpected refractive error resulting from inaccurate keratometry. Matossian reported that eyelid thermal pulsation treatment prior to cataract surgery significantly changed delta-K (difference in horizontal and vertical keratometry values) and axis compared to pre-thermal pulsation treatment ($P < .001$).[16] The results changed planned interventions for astigmatism correction in 40% of cases. Tear film irregularities, as evidenced by these studies, can impact preoperative biometry measurements, and, ultimately, IOL power calculations.

PREOPERATIVE DRY EYE DIAGNOSIS AND TREATMENT

Due to the relatively high prevalence of dry eye disease (DED) in the presurgical population and the potential impact of untreated DED on preoperative measurements, there is a growing interest among surgeons to diagnose and treat DED patients preoperatively. The American Society of Cataract and Refractive Surgery (ASCRS) Cornea Clinical Committee developed the Preoperative Ocular Surface Disease Algorithm designed for use in a preoperative setting with an emphasis and reliance on objective, non-invasive tests that can be performed by technicians.[17] The rationale is that preoperative visits already involve significant, often technician-driven refractive and biometric testing, so the algorithm would save eye care providers time.

For screening, both the Tear Film and Ocular Surface Dry Eye Workshop (DEWS) II and ASCRS recommend questionnaires to assess presence and severity of symptoms, as well as clues for underlying etiologies.[17,18] ASCRS recommends point-of-care testing to assess tear osmolarity and MMP-9 levels, and, if positive, more extensive clinical testing.[17] DEWS II recommends screening patients with tear breakup time, tear osmolarity, and/or ocular surface staining (cornea, conjunctiva, and eyelid margin) with fluorescein or lissamine green. Evaluating for MGD, including gland secretion quality and quantity, and tear volume will help to further classify the DED as either aqueous-deficient or evaporative dry eye.[19]

Treatment options have been discussed extensively in the DEWS II report, as well

as the International Workshop on MGD, but if visually-significant ocular surface disease is diagnosed during a preoperative cataract or refractive workup, an aggressive management approach is recommended by the ASCRS group.[17] The goal is to address ocular discomfort, MGD, aqueous production deficiency, and inflammation simultaneously to minimize the time to surgery. Artificial tears, such as SYSTANE COMPLETE (Alcon), are the first line of therapy for providing immediate symptom relief.[20] Heat and expression are the mainstay treatments for MGD.[21] While they can be performed separately, thermal pulsation treatments, such as iLUX (Alcon), allow eyelid heating and directly visualized gland expression to optimize clearance of meibomian gland ducts. Omega-3 supplements may also be considered to improve meibum quality and/or quantity.[21] Finally, aqueous deficiency and ocular surface inflammation may be treated with topical immunomodulators, topical corticosteroids, or oral antibiotics.[20]
The ASCRS Preoperative Ocular Surface Disease Algorithm offers a comprehensive discussion on treatment options for preoperative DED patients.[17]

CONCLUSION

Approximately half of cataract and refractive surgery patients have symptoms and/or signs of DED, and over half of asymptomatic patients present with signs suggestive of DED.[10-12] Algorithms provided by ASCRS and TFOS DEWS II help to facilitate the diagnosis and treatment process for DED, including MGD, and can be used to optimize patient comfort and ocular surface health before surgery. ■

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