ASCRS EyeWorld CME Supplement

Supplement to EyeWorld October 2013

Can improved ocular surface care really impact cataract and refractive surgery outcomes?

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The status of dry eye care in surgical practices

by Neda Shamie, MD

Dry eye is very common among patients presenting for cataract or laser vision correction surgery. If the dry eye is not treated preoperatively, it can reduce the quality of preoperative data and can have a negative impact on surgical outcomes.

Just prior to ASCRS, we surveyed cataract and refractive surgeons about the incidence of dry eye in their surgical patients, their awareness of current guidelines for the diagnosis and treatment of dry eye, and how they typically screen patients for dry eye, in order to understand the current state of dry eye care in surgical practices. The results were quite illuminating. For example, although research shows that rates of dry eye are very high in cataract-age populations, most respondents (65.7%) said that fewer than 20% of their cataract patients have dry eye that requires treatment other than artificial tears.

Most respondents (76.7%) also estimated that fewer than 20% of their laser vision correction patients required treatment other than tears for dry eye. These results suggest to me that dry eye is significantly underdiagnosed in surgical patients and may not be treated as aggressively as the literature recommends.

Appropriate assessment is an ongoing challenge in busy surgical practices. Although surgeons know the importance of identifying and treating dry eye preoperatively, they often don't spend enough time assessing and optimizing the ocular surface, which can contribute to less-than-optimal results. When we asked survey participants how they routinely evaluate dry eye in surgical patients, the results were quite varied:

- Corneal staining: 82.9%
- Tear break-up time: 80%
- Conjunctival staining: 51.4%
- Schirmer's: 42.9%
- Meibomian gland expression: 34.3%
- Questionnaire: 28.6%
- Topography: 22.9%
- OCT: 8.6%

Corneal and conjunctival staining and TBUT, not surprisingly, are leading diagnostic approaches. It is encouraging to see that topography is increasingly being used to assess the ocular surface, as it can be a powerful diagnostic tool. However, while many dry eye experts have abandoned the use of Schirmer's as a diagnostic tool, this is not reflected in general practice.

Treatment

We also asked how respondents would treat a 65-year-old patient presenting for cataract surgery with complaints of poor night vision and fluctuating vision, but no complaints of ocular irritation or foreign body sensation. A relatively low percentage (17%) said they were likely to treat that patient for dry eye, while 34% were somewhat unlikely and 26% very unlikely to offer dry eye treatment prior to surgery.

This can be a mistake because dry eye in elderly patients is more likely to manifest as fluctuating vision than as foreign body sensation, as Dr. Trattler explains elsewhere in this supplement.

In fact, we have very good evidence-based guidelines for diagnosis and treatment of dry eye. Divided into Levels 1 through 4, these guidelines have been published in the DEWS reports and elsewhere, yet most of our respondents were uncertain whether they were following the guidelines. It can be difficult to stay current with recommendations in this evolving field, but it behooves us all as surgeons to ensure that we are adequately screening for and addressing ocular surface problems in our surgical patients. Even mild to moderate dry eye can be treated effectively to improve postoperative outcomes.

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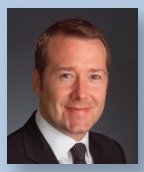

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Educational Objectives
Ophthalmologists who participate in this course will:

- Understand the key study data on the prevalence rates of dry eye signs and symptoms in patients undergoing cataract and refractive surgery;
- Identify the impact of DED on the various preoperative and postoperative elements of cataract and refractive surgery, and understand how this impacts outcomes; and
- Develop palliative and therapeutic treatment strategies to manage DED patients in an anterior segment surgical setting, both preoperative and postoperatively.

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Prevalence of dry eye in surgical populations

by William B. Trattler, MD

Dry eye is very common. In fact, approximately 40% to 50% of my patients who present for other complaints have dry eye. While it is more common in older patients, it's not uncommon to see patients in their teens and 20s with dry eye.

Risk factors for dry eye include older age, omega-3 deficiency, hormonal issues, low-humidity environments, computer work, and lifestyle factors, such as lack of sleep, smoking, or drinking alcohol.

Dry eye is prevalent among patients presenting for cataract and refractive surgery. Failure to treat dry eye preoperatively reduces quality of preoperative data, reduces visual acuity, and limits satisfaction.

Dry eye in cataract surgery patients

To determine the prevalence of dry eye in patients undergoing cataract surgery, we conducted a prospective study at nine sites across the country. The Prospective Health Assessment of Cataract patients' Ocular surface (P.H.A.C.O.) study included 272 eyes in 136 patients who were scheduled for cataract surgery. Patients' average age was 70 years.

Schirmer's test results showed that 53% were normal (>10 mm) and 47% were abnormal (10 mm or less). Of those with abnormal results, 21% had scores of 5 mm or less, which is strongly correlated with dry eye.

Patients' average tear break-up time across the nine sites was 4.95 seconds, with 63% of patients having tear break-up times of 5 seconds or less, which is a very rapid, abnormal tear break-up time.

We also found that 77% of eyes had some staining of the cornea, but, more importantly, 50% of eyes had staining in the central part of the cornea. This is important because it can significantly affect imaging results and impact IOL calculations.

Most patients in the P.H.A.C.O. study did not complain of ocular irritation or a sandy sensation. Interestingly, 59% of patients had no foreign body sensation whatsoever. Twenty-eight percent reported a foreign body sensation some of the time, while 13% had a foreign body sensation most or all of the time. Ophthalmologists will miss many cases of dry eye if they rely on reports of foreign body sensation. We need to examine and evaluate the ocular surface to detect cases.

In our study, we used the grading score of the DEWS system, and 81% of our patients had moderate to severe dry eye (Figure 1).[1] The DEWS report shows that once eyes have corneal staining, there is damage to the cornea. Even mild staining (not necessarily central but any staining) pushes patients up to a Level 2, which is the level at which initiation of prescription therapy is recommended.

Our study found that dry eye signs are very common in patients who are scheduled for cataract surgery, and patients are often asymptomatic. Both a rapid tear break-up time and corneal staining will significantly impact keratometry and topography (Figure 2).

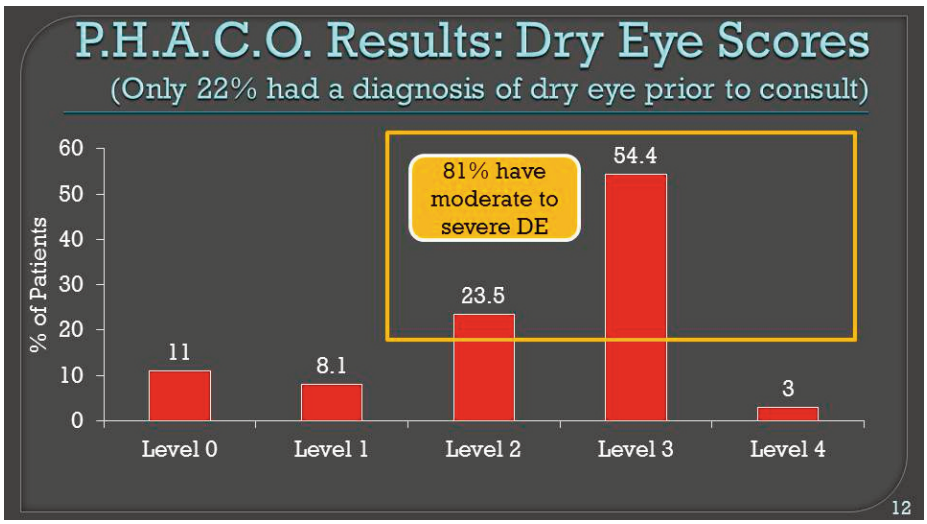

Figure 1. Eighty-one percent of patients had moderate to severe dry eye.

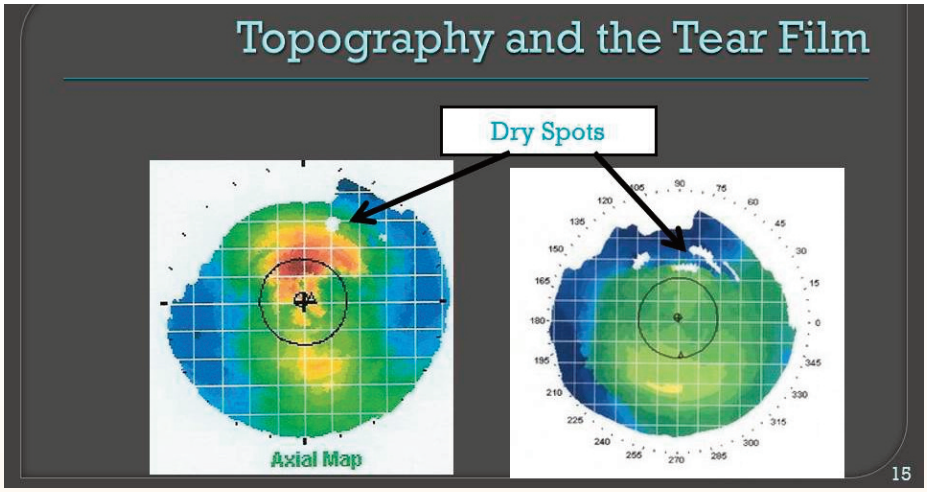

Figure 2. Dry spots on topography. The dry spots are causing some elevation right next to the white spot, which is loss of information. When using topography to look for dry eye, look for these dry spots or irregularities.

Dry eye in the laser vision correction population

Dry eye often causes contact lens intolerance, which motivates many people to seek LASIK. It has been found that one in six contact lens wearers will drop out of contact lens wear, and dryness and discomfort are the primary reasons for contact lens drop out. Patients are typically in their mid-20s when they drop out.

A study conducted by **Dan Durrie, MD**, evaluated patients before and after LASIK with regard to dry eye. He found that patients coming in for LASIK were often contact lens intolerant and had pre-existing dry eye. Shortly after surgery, patients' dry eye level increased a small amount; however, three to six months after surgery, their dry eye level was slightly less than it was preoperatively.

Dry eye has real consequences for laser vision correction candidacy, visual outcomes, and patient satisfaction. It can cause inaccurate preoperative wavefront measurements, inaccurate topography, blur or fluctuating vision, and discomfort.

We have very good stepwise protocols for classifying and treating dry eye. Unfortunately, most people don't use them. In 2012, only 27% of ophthalmologists reported knowing and/or regularly using treatment Delphi/DEWS guidelines.[1]

It's important for ophthalmologists to determine preoperatively whether patients have dry eye and then treat them appropriately. Patients with a healthy ocular surface will achieve much better imaging results and surgical outcomes.

Reference

1. Behrens A, Doyle JJ, Stern L, et al. Dysfunctional tear syndrome. A Delphi approach to treatment recommendations. *Cornea*. 2006;25:90-97.

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Clinical cases

Case 1: LASIK candidacy with mild dry eye

by George O. Waring IV, MD, FACS

Mild to moderate chronic keratoconjunctivitis sicca is often underdiagnosed and undertreated. However, these patients can be successfully converted to laser vision correction by optimizing the ocular surface.

Ocular surface optimization (OSO) is a phrase I use to describe utilizing whatever therapeutic regimen necessary to improve the ocular surface health in an attempt to convert patients to a safe and successful surgical procedure—whether this is laser vision correction on the cornea or an advanced technology IOL.

Take the recent case of a 55-year-old female non-contact lens wearing plano-presbyope who wants laser vision correction to reduce her dependence on her reading glasses. Her slit lamp examination was significant for decreased tear film volume, mild inspissation, conjunctivochalasis, inferior staining, and early nuclear sclerosis bilaterally. Treatment options in the U.S. include LASIK, PRK, CK, dysfunctional lens replacement, or no surgery at all.

We counseled her carefully about her dysfunctional lens changes and her mild but chronic dry eye to make sure that her expectations were set appropriately. We instated six weeks of ocular surface optimization. For this patient, we recommended hourly preservative-free tears, topical cyclosporine twice a day, and reverse bioengineered oral omega-3 fatty acids. Ocular surface optimization was followed with serial refractions, topographic and tomographic evaluation.

Once we observed clinical improvement, we determined that LASIK was appropriate for her non-dominant eye and performed thin flap hyperopic femtoLASIK with a target of –1.25 D. The flap diameter was programmed for 8.5 mm with an intended flap thickness of 110 μm. Because we did not treat the patient's dominant eye, we counseled her that she may feel a difference transiently between the two eyes. Interestingly, postoperatively, she could tell no difference between the two eyes with regard to dryness, which anecdotally supported our efforts to optimize her ocular surface.

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Case 2: Preop treatment improves surgical planning accuracy

by Craig McCabe, MD

A 75-year-old female was referred for progressive vision loss and red eyes. She complained of glare and difficulty driving at night as well as painful, gritty eyes. Her exam demonstrated a decreased tear meniscus, 2+ inferior corneal punctate epithelial erosions, and a 3+ nuclear sclerotic cataract OU. The lid margin was normal. An OPD-Scan of her left eye revealed a Placido image with the characteristic dull corneal light reflex and wavy, irregular mires, especially inferiorly, of a dry ocular surface. I think these corneal reflex characteristics are the first detectable objective sign of an underlying dry eye problem. More importantly, I have found that postponing the lens calculation measurements of a premium IOL patient until after his/her ocular surface disease has been treated, as measured by the Placido image, results in significantly better postoperative uncorrected visual acuity, smaller target-manifest refraction mismatch, and a lower enhancement rate.

Six weeks after our dry eye treatment (artificial tears six times/day, loteprednol four times/day, cyclosporine 0.5% two times/day, eye lid scrubs, and punctal occlusion), her dry eye symptoms were greatly improved. Compared to the first OPD-Scan, there was a noticeable improvement in the Placido image of the axial map. Also, there were significant changes in spherical aberration (decreased from 0.241 μm to 0.136 μm.), K values changed in both magnitude (0.36 D) and direction (12 degrees), and there was an increase in average pupil power (APP, 0.8 D). These changes are important to the surgical planning because they can affect the IOL type and power, as well as the magnitude and axis of astigmatism correction.

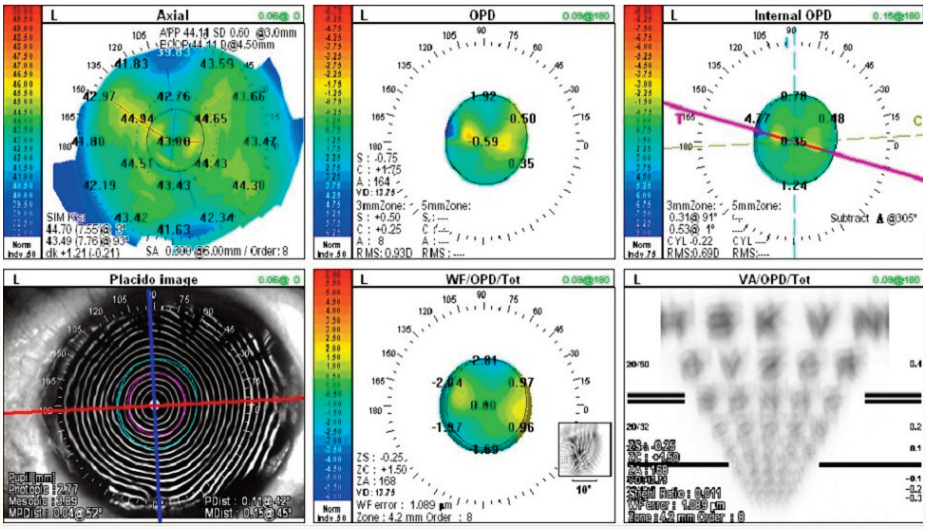

Figure 1: Case 3, postoperative day seven before dry eye treatment

In both eyes, dry eye treatment resulted in a 0.5 D change in the IOL power selected to achieve a plano result. It also revealed that her corneal astigmatism was significant enough to warrant corneal relaxing incisions (CRIs).

One month after cataract surgery with a multifocal IOL and CRIs, her UCVA OS was 20/20 and J1+ with a manifest refraction of –0.25 + 0.25 x 006 degrees. She was very satisfied with her new vision and enthusiastically looked forward to having surgery on her right eye. It is important to note that had we based the surgical plan on initial data without the benefit of prior dry eye treatment, the patient would likely have ended up with a manifest refraction of –0.75 +0.75 x 045 at best. Thus, preoperative treatment can mean the difference between needing to perform an enhancement procedure on an unsatisfied patient and having a very satisfied premium lens patient.

Case 3: Postop treatment improves image quality and satisfaction

A 65-year-old female presented one week after uncomplicated cataract surgery with a multifocal IOL in the left eye. She complained that the eye felt "sandy" and that her vision had worsened after postoperative day one. Her manifest refraction was –0.50 +1.50 x 175 degrees yielding a UCVA of 20/50 and J3. She was diagnosed with postoperative dry eye and irregular astigmatism (Figure 1). She began the dry eye therapy and was counseled on the potential need for a CRI in the future.

On her return visit one month later, her exam showed improvements in: UCVA (20/25 and J1), MR (–0.25 +0.75 x 178), total wavefront error (TWE, 1.089 μm to 0.580 μm), root

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Incorporating dry eye treatment into the surgical setting

by Francis S. Mah, MD

There are three dry eye management models: integrated, delegated, and clinic. I personally use the integrated model. The delegated model is for very busy surgical practices. These practices may have some junior associates, specialists, or optometrists in the practice who enjoy managing dry eye patients and tuning them up prior to surgery. Finally, there is a very comprehensive clinic style, which is a new style of practice, where dry eye management is generating income.

Models of management

In the integrated model, dry eye management is integral to the preoperative consult. The diagnosis is made during the preoperative exam, and treatment is prescribed to prepare for surgery. Some practices may treat all or nearly all patients. Surgical planning is not done until the ocular surface is stable. This model typically includes standard postoperative treatment protocols. The literature supports this because the number one complaint following laser refractive surgery and cataract surgery is dry eyes, and the majority of patients have dry eyes preoperatively, so it is important to identify and treat them preoperatively.

The delegation model is useful for a busy anterior segment surgeon or laser cataract surgeon who wants to treat eyes with a healthy ocular surface but minimize chair time. In this model, the preoperative and postoperative management of dry eye is delegated to an optometrist or to a junior associate. Treatment, if needed, occurs before referral to the surgeon.

In a comprehensive dry eye clinic, patients undergo a full battery of tests and a comprehensive evaluation. Patients with dry eye signs or symptoms are often reappointed to a specialized dry eye clinic within the practice. This clinic may offer out-of-pocket diagnostics and treatments, and it may sell nutriceuticals, etc. It can become a profit center and practice builder. In this model, dry eye care may proceed in tandem with the surgical workup scheduling.

Every practice has its own approach, but these three models demonstrate ways to successfully make dry eye evaluation and treatment a routine and effective part of surgical care.

Diagnosis and treatment

Preoperatively, to determine the degree of associated dry eye, slit lamp exam, Schirmer's testing, fluorescein or lissamine green stain, and tear break-up time can be used. Other diagnostic tools include blink rate, fluorophotometry, and tear osmolarity.

There are different types of patterns of tear film break-up time that might further identify the deficiency in the tear film (Figure 1). I put fluorescein in and after two minutes, I like to examine for staining. Following this exam, I measure the seconds before the tear film breaks up on the surface of the cornea. I typically use a conservative measure of 10 seconds as normal, but some people are using an even more conservative 7 seconds as the abnormal tear break-up time. Different types of corneal and conjunctival staining techniques give practitioners a picture of the patient's corneal integrity. Fluorescein staining with a Wratten filter can show even minimal insult to the cornea, and lissamine green and rose bengal can give similar clues to the health of the surface of the conjunctiva.

For experimental studies, we primarily use the NEI grid for corneal staining (Figure 2). There are five zones on the eye, and each zone is scored 0 to 3, for 15 possible points.

My primary approach is to base my diagnosis and management on actual symptoms. Dry eye disease symptoms include discomfort, dryness, burning or stinging, foreign body sensation, a gritty feeling, stickiness, blurry vision, photophobia, itching, and redness. Typically, patients will mention burning or fluctuation in vision. For me, fluctuation in vision is enough to establish that the patient probably has dry eye or ocular surface disease. However, it is important to note that symptoms seldom correlate with clinical signs.

I like to personally look at the tear lake, and I stain with fluorescein and lissamine green to look for corneal and conjunctival staining as described above. I evaluate the tear film break-up time, which is easy to do and gives me an assessment of the meibomian glands and how they're functioning. Finally, I push on the lower eyelid to look at the quality of the meibomian gland material and the meibum itself. This rapid but effective series of exams can be done without disruption of the clinical flow and can identify those patients who have ocular surface disease or who may be at risk.

Preoperatively, practitioners can also incorporate the TearLab Osmolarity Test. It aids in management, and osmolarity is probably the future of tear diagnostics. At this stage, for me it is more of a management tool rather than a diagnostic tool. We can also use LipiView, which measures the lipid in the tears and is an excellent tool for assessing the function of the meibomian glands. I typically do not use this as a diagnostic tool. Instead, I use it to help educate patients.

Categorizing dry eye

In 2006, a group of thought leaders including industry, PhDs, ophthalmologists, and optometrists met to consider a group finding on the state of dry eye disease. One of the conclusions of this "Delphi panel" was a chart that breaks the disease down into four categories of severity (Figure 3).

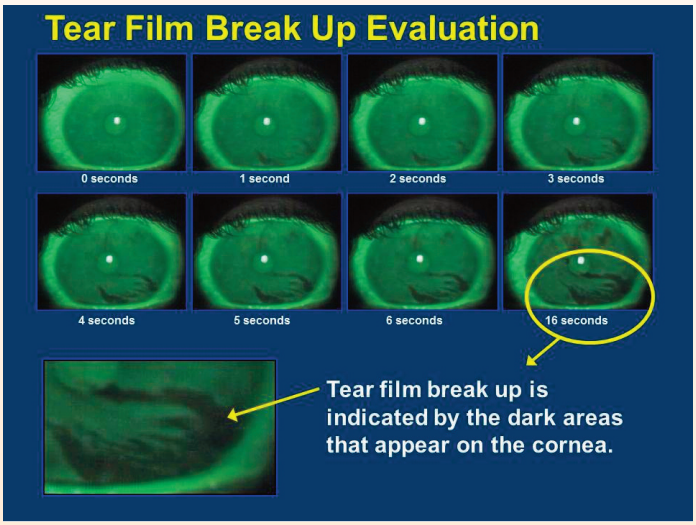

Figure 1. Here we see the progression from a lubricated/protected ocular surface with an intact tear film (post blink in a healthy eye) begin to degrade as time moves forward. Notice by 5 seconds, there is significant exposure to the cornea, and by 16 seconds we can say that the surface is far less protected than it was after the blink.

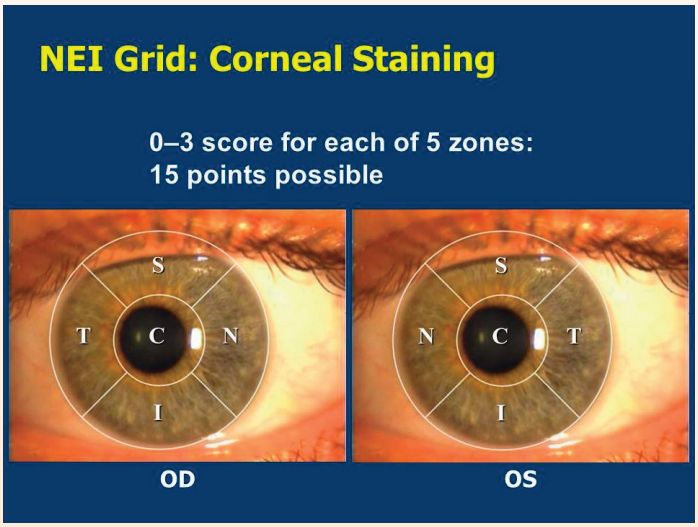

Figure 2. NEI grid for corneal staining

Delphi Panel Consensus for Dry Eye Management

SEVERITY	SIGNS AND SYMPTOMS	RECOMMENDED TREATMENT
1	Mild to moderate symptoms; no signs Mild to moderate conjunctival signs	Patient counseling, preserved tears, environmental management, use of hypoallergenic products, water intake.
2	Moderate to severe symptoms Tear film signs Mild corneal punctate staining Corneal staining Visual signs	Unpreserved tears, gels, ointments, cyclosporine A, secretagogues, topical steroids, nutritional support (flax-seed oil).
3	Severe Symptoms Marked corneal punctate staining Central corneal staining Filamentary keratitis	Tetracyclines, PUNCTAL PLUGS
4	Severe symptoms Severe corneal staining, erosions Conjunctival scarring	Systemic anti-inflammatory therapy, oral cyclosporine, moisture goggles, acetylcysteine, punctal cautery, surgery

Figure 3. Four categories of dry eye severity

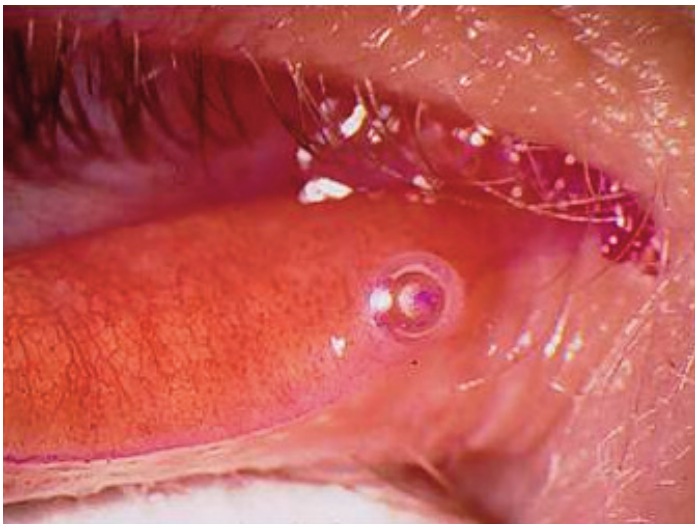

Figure 4. Punctal occlusion

After categorization, the group attempted to apply suggested treatment protocol to the levels of severity. While there is still a great deal of debate here, the Delphi group does suggest a first-line approach of lubricant eye drops before the disease progresses to more severe stages.

The most valuable treatments for chronic dry eye in the surgical setting are topical cyclosporine, topical steroids, and punctal occlusion.

Using topical cyclosporine 0.05% improves ocular surface health and decreases artificial tear use. It has also been associated with faster recovery and better outcomes for dry eye patients undergoing LASIK.

Corticosteroids have been shown to be effective even for patients with severe dry eye who had no improvement from other treatment modalities. However, the well-known side effects of corticosteroids usually preclude their long-term use.

Punctal occlusion can be helpful for patients with aqueous tear deficiency when medical means of aqueous enhancement are ineffective or impractical (Figure 4). Treatment with punctal occlusion results in decreased signs and symptoms. There are advantages to semipermanent plugs. For example, they can be removed if the patient develops epiphora or foreign body sensation from the plugs themselves. Punctal occlusion may also be made permanent with a disposable thermocautery or radiofrequency needle. For most patients, a semipermanent procedure should be considered first. The disadvantage of punctal occlusion is that it does not reverse the altered tear composition that underlies dry eye disease. Additionally, occlusion has the effect of retaining unhealthy tears on the ocular surface, which significantly decreases corneal sensation and tear production.

For Level 1 dry eye, try to eliminate the following exacerbating factors:

- Wind, air conditioning, dry heat, high altitudes
- Smog, exhaust, smoke
- Prolonged computer use
- Contact lens wear
- Medications that contribute to keratoconjunctivitis sicca

Also, preserved tears can be used up to four times a day. If these measures are ineffective or impractical, I use topical cyclosporine, which is the treatment of choice for Level 2 dry eye. For Level 3 dry eye, punctal plugs are used. I prefer to treat the inflammation before inserting plugs so that healthy tears are retained on the ocular surface.

Intraoperatively, minimize commercial drops and benzalkonium chloride. Additionally, try to minimize anesthetic drops. Balanced salt solution or viscoelastics can optimize the ocular surface. Also, try to reduce incision sizes, which will disrupt less corneal nerves.

Postoperatively, minimize the frequency of dosing commercial eye drops, and aggressively treat ocular surface disease. I typically hear the majority of complaints of dry eye symptoms when the anti-inflammatories are discontinued following cataract surgery. At that point, I reinstitute cyclosporine or artificial tears aggressively.

To summarize, there are a variety of models for effective and consistent dry eye management in the surgical setting. Diagnosis and treatment can be streamlined in the surgical setting but not ignored. Treating dry eye aggressively both pre- and postoperatively achieves optimal surgical results.

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mean square (RMS, 0.93 D to 0.31 D) for a 3.0-mm pupil and a much sharper and more regular Placido image.

Three months later, she agreed to a small CRI that further improved her UCVA (20/20 and J1+) and MR (+0.25 D sphere), TWE (0.349 μm), and RMS (0.22 D).

In this case, treatment of postoperative dry eye turned an unhappy multifocal IOL patient into a happy one. The improvement in her refraction after treatment demonstrates the importance of optimizing the ocular surface before performing costly and/or invasive corrective procedures that may further stress an already compromised ocular surface. By correcting ocular surface disease through dry eye treatment both before and after cataract surgery with premium lens implants, the two most common causes of patient dissatisfaction, namely ametropia and dry eye disease, can be significantly reduced.

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Ocular surface optimization protocol

by George O. Waring IV, MD, FACS

The first step in optimizing the ocular surface is to characterize the deficiency or disorder by determining the etiology, whether meibomian gland dysfunction, aqueous tear deficiency, allergic conjunctivitis, underlying systemic disorder, or a combination of any of the aforementioned.

Often, Baby Boomers presenting for surgery display clinical signs of chronic dry eye (such as conjunctivochalasis) with a multifactorial etiology. As a result, my first line treatment may include preservative-free tears every hour, twice-daily cyclosporine, and reverse bioengineered oral omega-3 supplements. If that regimen is ineffective, we may instate a low dose steroid and lower plugs. If this is not effective, we move on to preservative-free gels, upper plugs, and LipiFlow.

Patients who require ocular surface optimization include those with irregular astigmatism that may be related to keratoconjunctivitis sicca, those with moderate (Level 2) dry eye or worse, and those who are 50 years of age or older who have even mild dry eye signs or symptoms. In this age group, I have a very low threshold for treatment.

In young patients or in patients who have mild dry eye, the therapy should be continued for three to six months. For moderate to severe cases, we continue our recommended ocular surface optimization (OSO) regimen postoperatively, often with modifications to tailor the treatment to the patient's lifestyle. However, many patients require continued therapy indefinitely. It is important to tell patients that it is often a lifetime commitment. In addition, we are careful to set patient expectations appropriately regarding postoperative dryness with the technique of underpromising and overdelivering.

I recently treated a 65-year-old woman with mild hyperopia who wanted out of her reading and distance glasses. Slit lamp exam was remarkable for decreased tear lake, 1+ anterior staining, 1-2+ conjunctivochalasis, and 1-2+ nuclear sclerosis. Topography was remarkable for mild irregular astigmatism consistent with keratitis sicca and normal keratometric values. Treatment options included dysfunctional lens replacement, CK, LASIK, PRK, and no surgery at all. Although we felt that a dysfunctional lens replacement was clearly indicated, the patient felt strongly about pursuing LASIK.

As mentioned above, the first step in treating this patient is to optimize the ocular surface and then address the dysfunctional lens. This patient indicated that she was not interested in lens surgery, which is pretty rare in our practice. We counseled this patient carefully about her dry eye to make sure that she had realistic expectations. We instated six weeks of ocular surface optimization with frequent preservative-free tears, cyclosporine twice a day, and reverse bioengineered omega-3 fatty acids, and we performed serial topography/tomography and manifest refraction to see that they stabilized. The figures show her preoperative tomography and her tomography after six weeks of ocular surface optimization.

In this case, we performed thin flap hyperopic LASIK in both eyes. The target for her dominant eye was plano, and the target for her nondominant eye was –1.25 D. The flap diameter was programmed for 8.5 mm with an intended thickness of 110 μm. We decreased the flap diameter somewhat even though it's a hyperopic treatment, as she was older and had moderate dry eye to minimize impact on the nerve plexus. Postoperatively, she was 20/20 J1+. She had a stable ocular surface and was without subjective dryness and without complaints after six weeks of treatment.

Because of this patient's conjunctivochalasis and small cornea, these eyes can be difficult to dock depending on your femtosecond laser. I offset to the side, which engages the loose conjunctiva, then slide centrally so the flap is perfectly centered on the intended treatment.

It is not uncommon to encounter irregular epithelium when initiating flap lifts in elderly patients. Additionally, these patients may display an irregular hypertrophic epithelial healing pattern postoperatively that is often self-limited, which this patient experienced. Otherwise, the case was uneventful, and the patient was very happy with her postoperative uncorrected acuities of 20/20 and J1+. She knows that she will be returning to my office within 10 year to have her lenses replaced.

It is important to consider ocular surface optimization in patients with mild to moderate dry eye to convert them to LASIK or advanced technology IOL candidates. The next generation of procedures, such as corneal inlays, pockets, SMILE, and biomechanical modulation, will provide for further penetration into this market.

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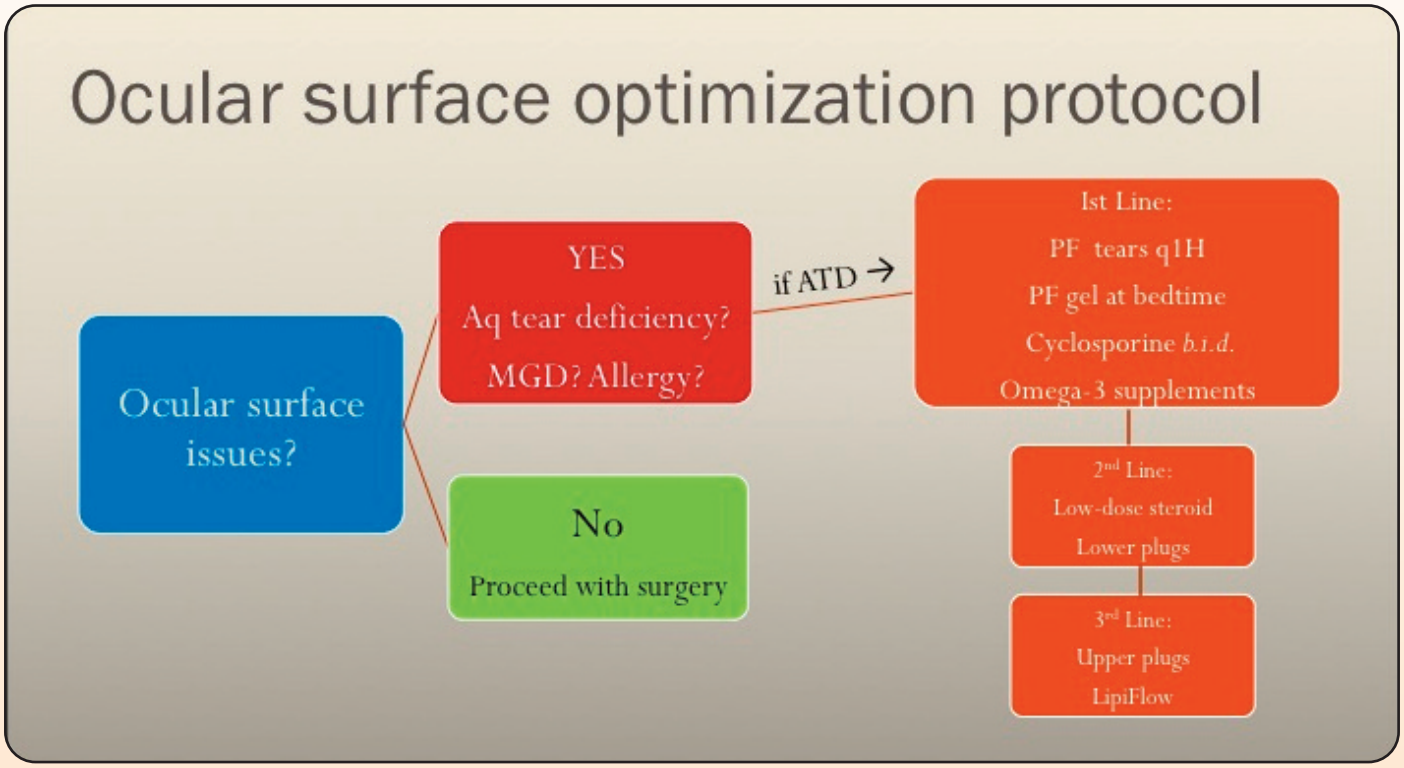

Can improved ocular surface care really impact cataract and refractive surgery outcomes?

In a survey conducted at a CME symposium presented at ASCRS, 850 attendees were reached, representing 175,000 refractive procedures, 450,000 cataract procedures, and 43,000 premium IOL procedures annually. More than one-third of these attendees have a premium IOL conversion rate of more than 10%. More than half (57%) practice outside the United States.

Attendees were surveyed about their opinions and practices before and after attending the symposium. After attending the symposium, there was a highly statistically significant shift in the belief that mild to moderate dry eye in surgical patients has a significant impact on visual outcomes (Figure 1).

Additionally, there was a significant shift in awareness. Participants were asked, "What percentage of cataract surgery patients present with Level 2 dry eye requiring treatment beyond artificial tears?" Before the symposium, none of the respondents answered correctly. After the symposium, 21% responded correctly (Figure 2).

There was also a shift in knowledge. Before the symposium, most (54%) participants did not know whether they diagnose and treat dry eye in a manner consistent with the guidelines. After the cases and presentations focusing on defining Level 2 dry eye and identifying treatment per the guidelines, 77% correctly identified the major differentiator between Level 1 and 2 (Figure 3).

Impact: Change in Opinion

Moore Outcome Level 3

Highly statistically significant ($p<0.01$) shift in the belief that mild to moderate dry eye in surgical patients has a significant impact on visual outcomes

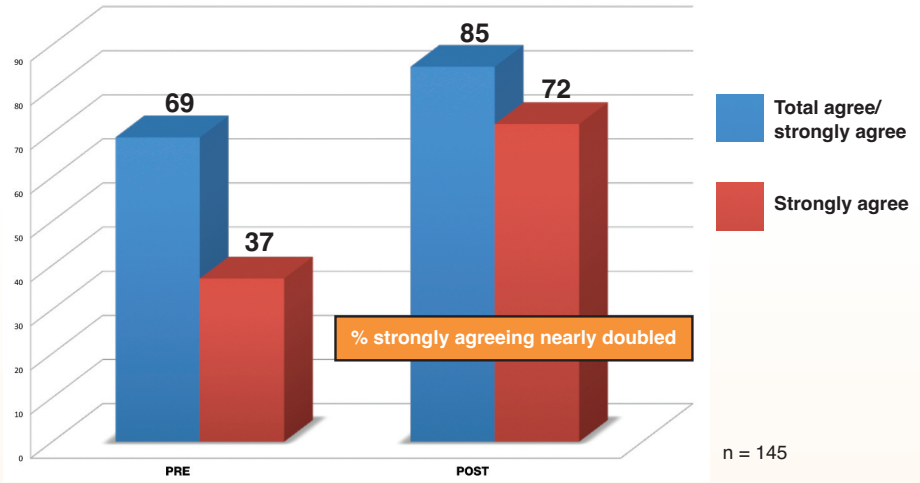

Figure 1

Impact: Knowledge Shift

Moore Outcome Level 3

What percentage of cataract surgery patients present with Level 2 dry eye requiring treatment beyond artificial tears?

(According to PHACO Study, it is >60%)

Prior to symposium no respondents answered >60% and only 6% answered >40% (Most thought it was <20%)

PHACO Study results presented by Dr. Trattler

Afterward, 21% responded correctly and 56% said >40%

This shift in awareness is highly statistically significant ($p<0.01$)

Figure 2

Impact: Knowledge Shift

Moore Outcome Level 3

Understanding of guidelines (DTS/DEWS/DELPHI) for diagnosis & treatment of dry eye

Pre-ASCRS

Majority (54%) did not know whether they diagnose and treat consistent with guidelines

Cases and presentations focused on defining Level 2 dry eye and identifying treatment per guidelines

Post-Symposium

77% correctly identified major differentiator between Level 1 & 2

Figure 3

CME Questions (Circle the correct answer)

1. According to the DEWS report, at what level of dry eye severity should therapy be initiated?

a. 1

b. 2

c. 3

d. 4

2. According to the NEI grid for corneal staining, the eye is divided into how many zones?

a. 3

b. 4

c. 5

d. 6

3. According to the NEI grid, what is the maximum possible score for each eye?

a. 15

b. 18

c. 21

d. 24

4. A patient presents to you with complaints of dryness requiring frequent artificial tears without relief. Your exam reveals marked punctate staining, some central corneal staining, and filaments in the tear film. At what level of dry eye disease should this patient be characterized, according to the Delphi Panel Consensus for dry eye?

a. 1

b. 2

c. 3

d. 4

5. In treating the patient described in Question 4, which of the following treatments do the Delphi panel guidelines recommend adding for the first time at this level of dry eye?

a. Nonpreserved tears

b. Punctal plugs

c. Punctal cautery

d. Topical steroids

6. According to Dr. Waring's ocular surface optimization protocol for patients undergoing surgery, what is the second line of treatment?

a. Cyclosporine and omega-3 supplements

b. Cyclosporine and preservative-free tears

c. Upper plugs and LipiFlow

d. Lower plugs and a low dose steroid

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