

EMBEDDING OSD DIAGNOSTICS INTO YOUR WORKFLOW

Objective testing is no longer ancillary.



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During the past decade, the rapid expansion of objective dry eye diagnostics has fundamentally changed the understanding and evaluation of ocular surface disease (OSD). A need to organize these tools into a practical, reproducible protocol led to the development of the ASCRS Preoperative OSD Algorithm in 2019,¹ which established a structured framework for efficiently diagnosing and classifying OSD in real-world practice.

Although originally developed for refractive and cataract surgery patients, the algorithm's core principles can be adapted to any patient with OSD. Technician-driven objective testing, the early identification of visually significant OSD, and seamless integration into a busy clinical workflow are emphasized. The ASCRS Cornea Clinical Committee is currently updating the original algorithm to reflect new evidence and therapies in OSD.

TECHNICIAN-DRIVEN SCREENING

In our workflow, patients' ocular surface diagnostic data are gathered before the physician enters the exam room. After noninvasive refractive and vision testing is complete, the same technician conducts an OSD screening of patients with symptoms or histories suggestive of the condition: tear osmolarity, matrix metalloproteinase-9 (MMP-9), noncontact corneal esthesiometry, and validated symptom questionnaires.

Symptoms Alone Miss Too Much

Although symptoms are important in OSD, they are often unreliable, nonspecific, or discordant with signs, particularly in the cataract surgical population. Many of these patients are asymptomatic despite having clinically significant OSD. We therefore emphasize objective testing of key ocular surface metrics as part of our office screening workflow.

Osmolarity and MMP-9 Testing Work Together

Tear hyperosmolarity (≥ 308 mOsm/L or intereye difference > 8 mOsm/L) reflects tear film instability and a loss of ocular surface homeostasis, and it is our key test that is specific for dry eye disease (DED). MMP-9 identifies abnormal ocular surface inflammation. This enzyme can be elevated in DED and other common subtypes of OSD that masquerade as DED. Testing both tear osmolarity and MMP-9 is critical because, together, they have a strong predictive value for DED, including early and asymptomatic disease, as well as other forms of OSD.¹

Normal Osmolarity Does Not Rule out Disease

In a prospective analysis of symptomatic patients with normal osmolarity, non-DED diagnoses such as

A PRACTICAL FRAMEWORK FOR THE OCULAR SURFACE EXAMINATION

The look, lift, pull, push framework is a simple, reproducible way to perform a targeted ocular surface examination. Used consistently, it can help you identify key findings that may distinguish dry eye disease from other ocular surface disorders and common masqueraders.

LOOK Before the slit-lamp examination, look at the patient's face, skin, and blink quality and quantity. Examine the appearance and position of as well as the symmetry between their eyelids. Assess the interpalpebral cornea and conjunctiva (lumps, bumps, epithelial irregularities, conjunctivochalasis, etc), tear meniscus height, and lid margin (collarettes, *Demodex*—best evaluated with the patient looking down at the slit lamp—biofilms, scurf, trichiasis, etc).

LIFT Lift the upper lid of each eye and evaluate the superior cornea for epithelial basement membrane dystrophy, Salzmann nodules, and other irregularities. Assess the conjunctiva for superior limbic keratoconjunctivitis, giant papillary conjunctivitis, and/or lacrimal gland enlargement.

PULL Pull the eyelids to assess their laxity. Be alert for floppy eyelid syndrome.

PUSH Push on the lid margin to evaluate the expressibility of the meibomian glands and meibum quality.

anterior blepharitis, allergic conjunctivitis, epithelial basement membrane dystrophy, and neuropathic corneal pain (NCP) were common.² Rather than exclude disease, a normal tear osmolarity result can shift the differential diagnosis.

When osmolarity is normal but MMP-9 is positive, we actively investigate non-DED inflammatory etiologies. When osmolarity is elevated but MMP-9 is negative, we often suspect early, mild, or situational DED without significant inflammation. Interpreting these patterns allows us to identify broader OSD subtypes and early disruption of homeostasis instead of labeling all signs and symptoms as related to DED.

Corneal Sensation Is a Critical Vital Sign

We also assess corneal sensation because NCP and neurotrophic keratitis (NK) are often initially misdiagnosed and mistreated as DED.

IDENTIFYING DED MASQUERADERS

Abnormal Results Warrant a Broader Workup

If any component of the screening battery is abnormal, our technicians conduct additional noninvasive testing to help classify OSD subtypes and assess their visual significance. These tests may include meibography, tomography, and ocular scatter analysis. Lactoferrin, immunoglobulin E, lipid layer thickness, blink rate, noninvasive tear breakup time, tear meniscus height, and conjunctival hyperemia may also be evaluated.

Esthesiometry Helps Unmask DED Masqueraders

In the past 2 years, noncontact corneal esthesiometry has been incorporated into nearly all our dry eye and ocular surface evaluations. This has significantly increased our detection of two major DED masqueraders emphasized in the Tear Film & Ocular Surface Society Dry Eye Workshop (TFOS DEWS) III diagnostic report on NK and NCP.³ The importance of recognizing and treating these entities early cannot be overstated.

In the absence of in vivo confocal microscopy, we rely on clinical suspicion, discordance between signs and symptoms, validated neuropathic pain questionnaires (eg, Neuropathic Pain Symptom Inventory–Eye), and noncontact esthesiometry to diagnose corneal nerve disorders. Whereas reduced corneal sensation raises suspicion of NK, heightened sensitivity supports a diagnosis of NCP.

Recent research by our group that will be presented at the 2026 Association for Research in Vision and Ophthalmology's annual meeting found that many unsatisfied patients presenting to our practice after seeing two or more physicians for DED were subsequently diagnosed with NCP.⁴

THE LOOK, LIFT, PULL, PUSH EXAMINATION

Objective testing can provide useful information but does not replace a careful slit-lamp examination.

We employ the look, lift, pull, push methodology described in the ASCRS algorithm (see the sidebar).¹ If the patient has not already undergone noncontact esthesiometry, the next step is invasive or contact corneal sensation testing for NK. Lastly, ocular surface staining with fluorescein, lissamine green, or both vital dyes is performed to detect damage.

INTEGRATING DIAGNOSTICS INTO DAILY PRACTICE

Although the aforementioned diagnostic testing and examination protocol was initially devised to diagnose visually significant OSD in preoperative patients, we have since adapted it for all patients in the busy Ocular Surface Center at Weill Cornell Medicine.

DED and OSD point-of-care diagnostics are no longer ancillary tests in our practice. Instead, they are embedded into our workflow as essential tools for detecting the loss of ocular surface homeostasis, preventing surgical complications, and delivering individualized care and treatment to our diverse patient population. ■

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