

Cryopreserved amniotic membrane surgery addresses recalcitrant MDE

Looking for, recognizing mechanical dry eye, or conjunctivochalasis, is half the battle

By Clifford L. Salinger, MD; Special to Ophthalmology Times®

Mechanical dry eye (MDE), also known as conjunctivochalasis, is a condition in which loosened, shortened, and wrinkled conjunctiva interferes with the tear meniscus and diminishes the fornix or tear reservoir. This condition occurs when the underlying Tenon's capsule is degenerated by matrix metalloproteinases.^{1,2}

This wrinkled tissue occupies the tear reservoir and prevents the eye from holding tears, which causes pain and irritation (that feels similar to dry eye symptoms) as well as fluctuating vision. Often, some of the wrinkled conjunctival tissue can disrupt the tear meniscus at the edge of the eyelids. When a patient blinks, this wrinkled conjunctiva can rub against the eye, causing further irritation and redness to an already inflamed eye.



Dr Salinger

Conjunctivochalasis is an often-overlooked cause of recalcitrant dry eye symptoms.

Evaporative tear dysfunction and aqueous tear deficiency are common topics of discussion, but many of us are either not familiar with MDE or we are familiar with it, but we do not specifically look for it. And if we do not look for it, we are not going to find it.

The best way to look for—and at—MDE is with fluorescein and a cobalt blue light, preferably with a slit lamp that has a yellow filter that can be dialed in. If that is not available, you can bring a yellow filter into the light path on the other side of the microscope between the patient's eye and the viewing microscope. The yellow filter highlights the redundant conjunctival folds, the corrugated conjunctiva in the interpalpebral space, and punctate staining of the cornea and the conjunctiva.

Looking for and identifying MDE is critical to an effective treatment plan, as is clear communication with the patient.

There are 4 factors that contribute to ocular surface disease (OSD): exposure to the environment,



inflammation, quantity of aqueous tear production, and tear quality, which relates to instability of the tear film.

Patients should also be aware that MDE is often a fifth factor. If we don't explain this up front, we may find ourselves having to introduce MDE as yet another issue late in the process, which can be a source of frustration to the patient. We find it best to provide information about MDE as a possible contributing factor to OSD no later than the second visit.

TAKE-HOME

► **The best way to look for MDE is with fluorescein and a cobalt blue light, preferably with a slit lamp.**

TREATMENT PLAN

When we diagnose MDE, we treat all other OSD factors nonsurgically first. Treatments to improve meibomian gland flow might include consistent daily, 15-minute applications of hot compresses, lid massage (possibly with NuLids [NuSight Medical], azithromycin or doxycycline topically or systemically, and an omega-3/omega-6 combination, such as HydroEye [ScienceBased Health]).

In some instances, we consider other meibo-

mian gland-directed treatments such as LipiFlow (Johnson & Johnson), iLux (Alcon), MiBo ThermoFlow (MIBO Medical Group), or other treatments to directly heat the oil glands and manually express them. If ocular surface inflammation is present, it may be treated with a steroidal eye drop, such as a loteprednol derivative fluorometholone acetate (Flarex, EyeVance Pharmaceuticals).

Furthermore, we educate patients about how important it is to become more aware of their environment and to avoid any unnecessary airflow blowing across their face and eyes. If patients can avoid airflow across their eyes, they will experience less evaporation of an already unstable tear, as well as less dryness, irritation, discomfort, burning, and stinging.

We explain to patients that we only produce a certain amount of tears in a day, and we want to preserve the tear quantity as much as possible by decreasing evaporation and improving tear stability.

When examining a patient who has MDE, we see “the tip of the iceberg,” because the redundant conjunctival folds are just above the lower lid margin where the tear meniscus is supposed

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to be. When we look at the interpalpebral conjunctiva, we see a corrugated conjunctival pattern, which may be a sign of persistent exposure to the elements and breakdown of the Tenon's capsule underneath the conjunctiva.

Matrix metalloproteinases cause an inflammatory cascade that breaks down the tight junctions of the Tenon's capsule, causing the Tenon's capsule to lose its tight adherence, and the conjunctiva becomes disinserted from both the underlying episclera as well as down in the inferior cul-de-sac and the inferior fornix.^{1,2}

The excess conjunctival folds that occupy the area of the tear meniscus in MDE prevent the normal position of the meniscus from forming, so when the upper eyelid tries to "grab" on to the meniscus, it is not there. In addition, this redundant, loose conjunctiva and Tenon's capsule interfere with the tear reservoir behind the lower lid that is supposed to be occupying the inferior cul-de-sac.

We defer surgery when we have exhausted all nonsurgical treatments and the patient still feels their symptoms are not adequately controlled. If symptoms are not adequately controlled after 3 to 6 months, surgical treatments may include cautery, argon laser, incisional/glue approaches, and cryopreserved amniotic membrane surgery. Some of our colleagues prefer using a radiofrequency (RF) device to cauterize and tack down the loose conjunctiva and Tenon's capsule, but in my opinion, this approach does not address the underlying problem.

We have seen many individuals who have had either undergone cauterization or RF of the conjunctiva, and their symptoms have not improved or have even worsened. These patients do not re-

turn to the doctor who performed the original treatment; instead, they end up seeking multiple opinions and become very frustrated.

The surgical treatment of MDE includes the Reservoir Restoration (RR) procedure using AmnioGraft (BioTissue) cryopreserved amniotic membrane. This procedure restores both the tear reservoir and the tear meniscus to their natural states and inhibits MMP activity.³

This procedure becomes much more challenging if it is performed on a patient who has already undergone one of the previously mentioned surgical treatments because the anatomy has been significantly altered by cautery or the RF treatment.

RR TECHNIQUE

When we use the RR procedure, it is important to address the pathology all the way across the inferior cul-de-sac, especially medially, to remove the excess conjunctiva that often overhangs the inferior puncta. If redundant conjunctiva overhanging the inferior puncta remains, oftentimes patients will still have epiphora.

Many individuals have MDE both inferiorly and superiorly. We often refer to the superior aspect as superior limbic keratitis.

The majority of patients have significant improvement in their symptoms when we just address the inferior 180°, and we do not need to address the superior. If the initial procedure does not adequately improve the patient's symptoms, we can go back a few months later and consider performing a similar surgical procedure along the superior 180°.

The RR surgical procedure starts with an incision about 3 mm to 4 mm peripheral to the limbus, dissecting inferiorly and preserving the limbal stem cells. Remove as much of the loose, disinserted Tenon's capsule as possible, ideally all the way down to the inferior orbital rim.

Cauterize any prolapsed orbital fat so that it regresses back into the orbit. Place 2 layers of

AmnioGraft—1 smaller piece over the inferior rectus muscle, and a second, much larger layer covering the entire dissected area, from just inferior to the limbus down into the inferior cul-de-sac, all the way across—from medial to lateral. Apply tissue glue to keep the membranes in place and consider adding a few stitches at the corners.

Place the conjunctiva that has been resected, laying it over the larger amniotic membrane layer, and glue it in position, adding a few sutures deep in the inferior fornix or around the periphery if needed, but avoid placing any sutures into the inferior rectus.

The surgical results are very gratifying. Many patients with bilateral MDE have their symptoms measurably improve even in the less severe eye after undergoing RR surgery on the more symptomatic eye. Although there is no clinical explanation for this, the improvement tends to be significant enough to enable us to forgo surgical treatment of the fellow eye. ■

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