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## Awareness facilitates treatment of LASIK-associated dry eye

**Drugs, preservative-free tear agents, punctal occlusion help meet the 'LASIK tear film challenge'**

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- Home
- CME
- Current Issue
- Practice Management
- Feature Articles
- Editorial
- Meeting Calendar
- Supplement



- News
- E-News
- AAO News
- News from Industry
- In Brief
- InDispensable
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- Dispensing News
- Dispensing Feature Articles
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- Cornea
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- Reprints
- Lists
- Digital Ad Specs

Baltimore-LASIK presents a challenge to normal tear film dynamics, and some patients may be affected by prolonged neurotrophic epitheliopathy.

Therefore, preoperative management of LASIK candidates should include careful examination for and treatment of pre-existing dry eye along with adequate informed consent discussions about this potential protracted risk, said Terrence P. O'Brien, MD.

"Solomon and co-workers found in a recent survey that dry eye is both the most common complication after LASIK as well as the most common reason for patient dissatisfaction. Therefore, it is important to be aware of factors that can help us and our patients survive the LASIK tear film challenge," said Dr. O'Brien, associate professor and director of refractive eye surgery, Wilmer Eye Institute, Johns Hopkins University School of Medicine, Baltimore.

He reported that up to 80% of patients who undergo LASIK experience symptoms of dry eye postoperatively, and a small proportion, up to 2%, develop punctate epithelial erosions of the corneal flap without having any history of dry eye. Symptom onset typically occurs within a few days to weeks after the procedure, but patients might be unaware of their problem due to the presence of a neurotrophic keratopathy.

### Multiple causes

The underlying etiology is not completely understood, but it appears to be multifactorial. Patients undergoing LASIK might be predisposed to dry eye problems owing to contact lens intolerance, and various features of the surgery itself are contributory, including possible suction ring-induced damage to the corneal surface and goblet cells and the effect of the ablation in changing the relationship between corneal contour and the lid margin.

Severing of corneal nerves by the microkeratome is another important potential mechanism because it disrupts the neural reflex arc involved in blinking and tear secretion and may also lead to decreased release of neurotrophic factors.

Notably, however, Donnenfeld and co-workers have shown that creating a flap with the hinge located nasally, a technique that spares one of the two horizontal nerves entering the cornea at the 3 and 9 o'clock positions, offers better preservation of corneal sensation than a superior hinge flap that disrupts both horizontal plexuses, Dr. O'Brien observed.

Reinnervation of the corneal epithelium usually occurs over a period of 6 weeks to 4 months, and while treatment strategies for postLASIK dry eye are not optimum, symptoms can be controlled in most patients until the tear film reflex loop is re-established.

Currently, intervention consists of a multipronged approach, including identification of factors that can provoke or aggravate dry eye, along with fluid replacement, application of autologous serum tears in severe cases, and punctal occlusion.

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## Management

"Our management priorities are threefold—we want to address conditions that worsen dry eye and then supplement and preserve the tear film," Dr. O'Brien said.



He noted there are a number of drugs that can worsen the patient's condition by their activity in suppressing tear secretion. That list includes antihistamines, decongestants, diuretics, and antidiarrheal agents, along with some antipsychotics, tranquilizers, antihypertensives, and antidepressants. Consideration should also be given to lid dysfunction as well as meibomian gland dysfunction with use as needed of adjunctive treatments such as oral tetracycline therapy, which might improve the quality of the tear lipid layer.



In choosing artificial tear agents to supplement the tear film, selection of preservative-free products is key. Dr. O'Brien noted that a variety of alternative therapies, including flaxseed oil, primrose oil, and a commercially available dietary supplement (HydroEye, ScienceBased Health, Carson City, NV), as well as an oral nutritional supplement for dry eye (BioTears, Biosyntrx) have been advocated as beneficial as well. However, claims for their efficacy lack support from carefully controlled studies published in peer-reviewed journals. A variety of possible therapies may be available in the future, including topical cyclosporine, androgens, secretagogues, eicosanoids, mucin, and aquaporins.

Use of punctal occlusion, either temporary or permanent, addresses the third management principle of preserving the tear film.

"We have a low threshold for placing collagen plugs in the perioperative period after LASIK, and we will use permanent plugs or perform cautery for complete punctal occlusion as indicated in severe cases," Dr. O'Brien said.

Looking to future therapies, he reported that results from early studies indicate promise for various investigational agents that act to hasten recovery of corneal sensation. Prompted by a study describing the efficacy of nerve growth factor (NGF) for restoring corneal integrity in eyes affected by corneal neurotrophic ulcers, Dr. O'Brien and colleagues conducted an investigator-masked trial of topical NGF in rabbit eyes. Using Cochet-Bonnet esthesiometer measurements for outcome assessment, they found NGF accelerated recovery of corneal sensation after LASIK compared with BSS-treated controls.

"Ultimately, topical NGF may have a beneficial role for the management of postLASIK dry eye," Dr. O'Brien said.

Promise for better treatment in the future is also offered by other neuronal growth factors, including macrophage migration inhibitory factor (MIF), which may act directly to hasten recovery of the ocular surface or indirectly through action on macrophages.

### About the Author

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