Plugs Reduce Dry-Eye Symptoms, Improve Vision

Study shows this low-cost, tried-and-true technique still has an important role to play in the management of dry-eye disease.

DRY EYE IS PERVERSIVE AMONG MY patients. I would estimate that at least 15 percent of my overall patient population suffers from dry eye, but the rates are much higher among key subgroups including: those with autoimmune disorders or acne rosacea; contact lens wearers; patients taking certain systemic medications, such as antihistamines, beta blockers and antidepressants; and those who are post-LASIK or post-cataract surgery.

The good news for those who suffer from dry eye is that this once “boring” condition is suddenly the topic du jour at professional ophthalmology meetings. Higher patient expectations, multifocal intraocular lenses, new research, new instruments that measure corneal wavefront aberrations, higher-quality tears, omega-3 vitamins and new anti-inflammatory therapies have all contributed to the buzz about dry eye.

The downside is that most of these new treatments are quite expensive for patients, requiring ongoing compliance with drops and/or oral supplements that often don’t fully resolve their symptoms. Furthermore, I am not convinced that inflammation is truly the culprit for many older dry-eye patients, particularly given my underwhelming experience thus far with topical cyclosporine therapy in patients older than 50 years. Certainly, there are patients who benefit from inflammatory suppression. Younger dry eye patients, those with autoimmune disorders, patients with very advanced symptoms or obvious conjunctival inflammation and injection are good candidates for Restasis and/or topical corticosteroids.

But the majority of dry-eye patients may simply have age-related cicatricial changes to the lacrimal glands, perhaps compounded by systemic medications or preserved topical agents that prevent them from producing sufficient tear volume. As the tear volume decreases, the concentration of inflammatory mediators in the tears rises. Patients then rub their uncomfortable eyes, releasing more inflammatory cytokines. So, while there is sub-clinical inflammation, we may be able to resolve it without the expense, hassle and potential side effects of anti-inflammatory therapy.

Punctal occlusion has previously been reported to be very effective for the treatment of dry eye, relieving symptoms and enabling patients to reduce their use of lubricants. I have had excellent results with punctal plugs in the past and wanted to measure in a more meaningful way the benefits of punctal plugs in my patients with dry-eye syndrome.

Prospective Study

I undertook a prospective, non-ran-
Plugging Pearls

Size correctly. Incorrect sizing is probably the primary contributor to spontaneous punctal plug loss. A plug that is too large or too small can also cause erythema, chemosis, extrusion and discomfort. A punctal gauge may be helpful for anyone who is having difficulty with plug retention.

In my study, the small plugs fit the majority (72 percent) of patients, while 24 percent needed the medium size and 4 percent the large size. Extra small plugs are also available, but were not used in this study.

Position correctly. The dome of the plug should be seated perfectly flush against the punctum, without any space between the flat edge and the punctum. A gap or overhang will cause a foreign body sensation and epiphora for which the patient will request removal, if they have not rubbed it out first. When inserting a Parasol plug, one should feel a small amount of resistance during insertion, then a sudden easing as the plug “pops” into place. This occurs as the parasol end compresses as it slides through the punctum and then reopens. The properly sized plug will seat well and be comfortable to the patient.

Choose wisely. I typically plug the superior puncta first in mild to moderate dry eye. Although this is a bit unconventional, I feel that patients with the common comorbidities of blepharitis and/or acne rosacea would benefit more from gravity-enhanced drainage of meibom and cytokines through the lower puncta. Patients are also less likely to experience epiphora if the lower puncta are left open. In severe dry eye, I will plug the lower punctum initially. Furthermore, I never plug both upper and lower puncta at the same time. If, at the return visit, the patient needs a little more moisture or is bothered by the upper plug, then I will remove the plug and place it in the lower punctum.

Educate patients. Teach patients to blot or dab their eyes, rather than rub them to relieve discomfort. Not only can rubbing dislodge the plug, but it will also release cytokines and other inflammatory mediators into the tears, worsening dry eye symptoms. Also, tell them they may still need to use an artificial tear drop occasionally if symptoms recur.

These steps can improve your success rate with punctal occlusion by maximizing patient comfort and plug retention.

—CMcC, MD

domized study of punctal plugs in patients who had failed artificial tears and had chosen to try punctal occlusion after an explanation of several alternative options.

A total of 108 patients (216 eyes) with symptoms of dry eye and Schirmer scores <10 mm were enrolled. The average age was 63 ± 14 years. None of the subjects were using any other topical drops or oral supplements for dry eye. Parasol Punctal Occluders ( Odyssey Medical) were inserted bilaterally in all subjects (See Figure 1). Patients were seen for a follow-up visit two to four weeks after insertion of the plugs, and again at one year.

At the first follow-up visit, 91 percent of patients reported that their eyes had more moisture, and 77 percent said they had fewer dry-eye symptoms (See Figure 2). Most (78 percent) were very pleased with the plugs, which is a much more positive response than I have seen anecdotally to cyclosporine therapy. Additionally, Snellen acuity improved by one or more lines (average of two lines improvement) in 43 percent of the eyes. These gains in comfort and vision held steady at the one-year visit.

Plug retention was very high, at 92 percent. Of the 8 percent of plugs that were lost, the average retention was 70 days, with a mean of 21 days. In several prior studies, the reported

DisCoVisc® Ophthalmic Viscosurgical Device (Sodium Chondroitin Sulfate — Sodium Hyaluronate).

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Warnings: Failure to follow assembly instructions or use of an alternate cannula may result in cannula detachment and potential patient injury.

Precautions: Precautions are limited to those normally associated with the surgical procedure being performed. Although sodium hyaluronate and sodium chondroitin sulfate are highly purified biological polymers, the physician should be aware of the potential allergic risks inherent in the use of any biological material.

Adverse Reactions: DisCoVisc® Ophthalmic Viscosurgical Device was very well tolerated in nonclinical and clinical studies. A transient rise in intraocular pressure in the early postoperative period may be expected due to the presence of sodium hyaluronate, which has been shown to effect such a rise. It is therefore recommended that DisCoVisc be removed from the anterior chamber by thorough irrigation and/or aspiration at the end of surgery to minimize postoperative IOP increases. Do not overfill anterior chamber.

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plug retention rates have been much lower, between 49.3 percent and 69.5 percent. The higher retention rate in my study may be due to a combination of proper sizing and insertion, plug quality and patient education (See sidebar).

**Better Vision**

The positive impact of punctal occlusion on visual acuity in this study is very exciting, although it is not a total surprise. The tear film is the first refracting surface of the eye, so it stands to reason that it would affect acuity. We know, too, that fluctuating vision is a common symptom of dry eye and that dry eye is a major source of patient dissatisfaction with refractive surgical results.

In fact, there is a growing body of evidence in the refractive surgery literature that treating dry eye (with plugs or otherwise) has benefits in terms of visual outcomes and patient satisfaction. For example, researchers at the New York Eye & Ear Infirmary recently reported that patients considering refractive surgery for very low refractive errors were able to achieve sufficient visual improvement with plugs alone. In this study, 18 of 21 eyes had a one- to three-line improvement in visual acuity one month after punctal plug insertion. Only one patient went on to have refractive surgery.

Another group reported that dry eye increased the risk for regression after refractive surgery. That regression may have just been dry-eye-related reduced acuity. Punctal occlusion has also been shown to significantly reduce higher-order aberrations in post-LASIK eyes.

In treating dry eye, we tend to measure improvements in tear breakup time (TBUT), corneal staining or ocular surface disease index (OSDI) scores.

**Figure 2. Study Results**

<table>
<thead>
<tr>
<th>More moisture</th>
<th>Fewer symptoms</th>
<th>Happy with plugs</th>
<th>Improved vision</th>
</tr>
</thead>
<tbody>
<tr>
<td>91</td>
<td>77</td>
<td>78</td>
<td>43</td>
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But from the patient’s perspective, an improvement in vision is the most satisfying result.

**Advantages of Punctal Occlusion**

As part of our armamentarium for the management of dry eye, punctal plugs have a number of advantages. They are generally covered by insurance, so the financial burden for the patient is low, yet the physician is fairly compensated for their insertion. Plugs are not dependent on patient adherence or dexterity for efficacy and, in fact, reduce the burden of compliance on patients by reducing the need for artificial lubricants.4,12

Punctal occlusion is reversible and, with most types of plugs, the safety profile is very high, with epiphora, conjunctival irritation and extrusion typically being the only complications.

There is no single, best “recipe” for treating the dry-eye patient. As clinicians, we should do our best to determine the underlying etiology of the disorder and treat accordingly, tailoring dry-eye therapy to the needs and personality of the patient, his financial situation and the clinical presentation. Certainly, there remains an important role for punctal occlusion in such a paradigm. 10

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**REVIEW**

**PUNCTAL PLUGS**

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