

# Punctal Plugs: An Essential Tool in the Management of Dry Eye

**According to current studies, as many as 30 million American adults may have symptomatic dry eye disease (DED).<sup>1,2</sup> Many of these individuals elect to self-manage their symptoms, usually turning to over-the-counter eye drops. A smaller percentage seek the advice of eye care professionals, who may recommend a myriad of treatment options such as artificial tears, gels or ointments, lid hygiene products, topical or oral pharmaceuticals and nutritional supplements. Less commonly, physicians may employ in-office procedures designed to mitigate symptoms and promote ocular surface health. And although a range of new technologies has been introduced in recent years, no single treatment has emerged that can successfully address all cases of DED.**

## Historical Perspective

Punctal occlusion has been a recognized therapy for managing disorders of the ocular surface since the 1930s.<sup>3,4</sup> The concept of punctal occlusion involves a very simple and straightforward mechanism of action. By creating a physical obstruction to tear drainage through the canaliculus, clinicians can provide both increased tear volume and enhanced tear residence time on the ocular surface.<sup>5</sup>

Through the 1990s and early 2000s, punctal plugs were a mainstay of dry eye therapy. As recently as 2003, experts were recommending punctal occlusion for even mild DED (defined as symptoms of dryness without observable signs), typically incorporating this treatment as second-line therapy for those who failed to attain symptomatic relief with tear substitutes alone.<sup>6,7</sup> Despite the advent of many new forms of therapy, the most current and comprehensive publication on DED—the TFOS DEWS II Report (2017)—remains favorable to early intervention with punctal plugs. In the new treatment algorithm for staged management of DED, experts list punctal occlusion just after the use of non-preserved ocular lubricants, but before prescription drugs such as topical anti-inflammatories (see “TFOS: DEWS II Punctal Occlusion Recommendations”).<sup>8</sup>

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## When and Where to Plug

While we know that punctal plugs are not ideal for every DED patient, it is important to understand where they may play an appropriate and essential role in therapy. First and foremost, punctal plugs should be considered in all cases of aqueous-deficient DED—specifically, those individuals who show diminished tear volume (as measured by Schirmer strips, phenol red thread test or direct measurement of the tear meniscus), reduced tear stability (rapid tear break-up time) and a symptom profile consistent with dry eye. This includes patients with underlying systemic conditions that predispose toward DED, such as Sjögren syndrome or rheumatoid arthritis, as well as those taking medications that are known to reduce tear production.

Second, patients who develop DED as a consequence of contact lens wear or refractive surgery may also be excellent candidates for punctal plugs. Recent studies corroborate this recommendation.<sup>9,10</sup>

Third, punctal plugs may benefit patients who are consistently using topical anti-inflammatory medications for DED (e.g. cyclosporine or lifitegrast) but who nonetheless continue to be symptomatic.<sup>15</sup> Additionally, those patients with incomplete lid closure or corneal irregularities that affect tear stability should be considered for punctal plugs.

It is important to understand also that punctal occlusion does not preclude the concurrent use of artificial tears. On the contrary, artificial tears may provide an additional mechanism for relief of sporadic symptoms, but studies have shown that punctal plugs help to significantly reduce the need for frequent drop instillation in patients with DED.<sup>10-12</sup>

## Product Considerations

A wide variety of punctal plugs are currently available from numerous manufacturers, but in general there are three basic categories: short-term temporary plugs, long-term temporary plugs, and permanent plugs. The short-

term variety, such as the VeraC7™ are composed of collagen and designed to be absorbed completely in seven to 10 days. Practitioners should think of collagen plugs as a diagnostic tool to determine if punctal occlusion will be well-tolerated by the patient.

Long-term temporary plugs are composed of synthetic polymers that absorb more slowly than collagen. The Vera90™ is made of ε-caprolactone/L-lactide copolymer (PCL), a substance that absorbs in 60 to 180 days. Lacri-vera's temporary plugs are 2.0 mm in length and reside completely within the canaliculus once inserted. They come in 0.3, 0.4 and 0.5 mm diameters to accommodate a range of punctal openings. Long-term temporary plugs are an excellent option for patients that may be expected to have self-limited DED issues, such as those anticipating refractive or cataract surgery. In addition, these can be used for patients who have been identified as good candidates for punctal occlusion, but suffer from awareness with conventional punctal plugs that have exposed caps along the lid margin.

Permanent plugs are composed of non-dissolvable materials, most commonly silicone, although some hydrogel and acrylic devices are also available. The VeraPlug™ and VeraPlug™ FlexFit™ are both silicone plugs designed in the Freeman style. Both products are available in multiple sizes to accommodate various sized punctal openings, but the newer FlexFit™ offers a unique nose technology that collapses upon insertion, thereby allowing for easier sizing and placement. Lacri-vera also offers a product designed to provide partial occlusion. The VeraPlug™ Flow has a narrow inner channel that reduces, but does not completely eliminate tear outflow. It is ideally suited for patients who benefit from punctal occlusion, but experience epiphora with standard permanent plugs.

Regardless of which occlusion device is used, billing and coding remains consistent. Reimbursement is identical for short-term collagen, long-term synthetic inserts and silicone punctal plugs, although most third-party payers limit the frequency that a provider can bill for this service. Checking with the patient's carrier before carrying out these procedures helps to avoid denials and appeals.

## The Take-home Message

While punctal occlusion may not be a new therapy, it has proven its value time and time again. Despite setbacks, research and expert consensus validates this treatment modality as a beneficial aspect of DED therapy. Earlier intervention with punctal occlusion makes sense in a great many cases, particularly those outlined here. And

## TFOS DEWS II Punctal Occlusion Recommendations<sup>8</sup>

The DEWS II Report also stipulated those clinical situations where punctal plugs might specifically be indicated:

- Dry eye associated with a rapid tear film break-up time
- Aqueous-deficient dry eye secondary to systemic disease (e.g., Sjögren syndrome)
- Systemic medications that reduce tear production (e.g., antihistamines, antidepressants)
- Symptomatic contact lens wear
- Dry eye related to refractive surgery
- Lid closure abnormalities
- Corneal irregularities or scarring that affects tear stability
- Toxic epitheliopathy
- Superior limbic keratoconjunctivitis

while addressing ocular surface inflammation is of great importance, concomitant tear conservation with punctal occlusion appears to further diminish signs and symptoms in those with DED. Unquestionably, these devices should be utilized much more frequently than current trends indicate. Incorporating the use of punctal plugs in one's practice helps to expand its therapeutic reach, enhance its financial health and achieve greater overall patient satisfaction. ■

1. Paulsen AJ, Cruickshanks KJ, Fischer ME, et al. Dry eye in the beaver dam offspring study: prevalence, risk factors, and health-related quality of life. *Am J Ophthalmol*. 2014;157(4):799-806.
2. US Census Bureau. Annual estimates of the resident population for selected age groups by sex for the United States, States, Counties, and Puerto Rico Commonwealth and Municipios: April 1, 2010 to July 1, 2014. Available at: <http://files.hawaii.gov/dbedt/census/popestimate/2014-state-characteristics/>
3. Beetham WP. Filamentary Keratitis. *Trans Am Ophthalmol Soc*. 1935;33:413-35.
4. Macmillan JA, Cone W. THE PREVENTION AND TREATMENT OF KERATITIS NEURO-PARALYTICA BY CLOSURE OF THE LACHRYMAL CANALICULI. *Can Med Assoc J*. 1937 Oct;37(4):348-50.
5. Chen F, Shen M, Chen W, et al. Tear meniscus volume in dry eye after punctal occlusion. *Invest Ophthalmol Vis Sci*. 2010 Apr;51(4):1965-9.
6. Murube J. Surgical treatment of dry eye. *Orbit*. 2003 Sep;22(3):203-32.
7. Calonge M. The treatment of dry eye. *Surv Ophthalmol*. 2001 Mar;45 Suppl 2:S227-39.
8. Jones L, Downie LE, Korb D, et al. TFOS DEWS II Management and Therapy Report. *Ocul Surf*. 2017 Jul;15(3):575-628.
9. Li M, Wang J, Shen M, et al. Effect of punctal occlusion on tear menisci in symptomatic contact lens wearers. *Cornea*. 2012 Sep;31(9):1014-22.
10. Alfawaz AM, Algehedan S, Jastaneiah SS, et al. Efficacy of punctal occlusion in management of dry eyes after laser in situ keratomileusis for myopia. *Curr Eye Res*. 2014 Mar;39(3):257-62.
11. Roberts CW, Carniglia PE, Brazzo BG. Comparison of topical cyclosporine, punctal occlusion, and a combination for the treatment of dry eye. *Cornea*. 2007 Aug;26(7):805-9.
12. Nava-Castaneda A, Tovilla-Canales JL, Rodriguez L, et al. Effects of lacrimal occlusion with collagen and silicone plugs on patients with conjunctivitis associated with dry eye. *Cornea*. 2003 Jan;22(1):10-4.