

Considerations for Lacrimal Occlusion in the Moderate Dry Eye Patient

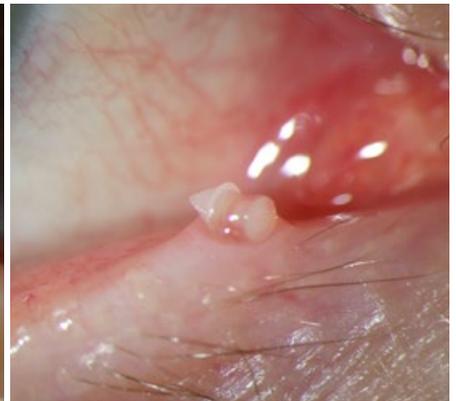
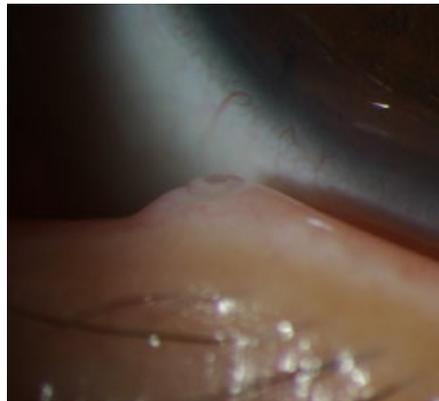
Although there has been a proliferation of newer diagnostic and therapeutic options for moderate dry eye, punctal occlusion remains an effective treatment, according to the Academy's *Ophthalmic Technology Assessment (OTA)* Committee. It conducted a literature review to determine the clinical efficacy and safety of lacrimal drainage system plugs and found that—based on level II and level III evidence—the signs and symptoms of moderate dry eye were improved, and patients experienced few serious complications.¹

The 3 basic types of plugs—collagen plugs, silicone punctal plugs, and intracanalicular plugs—have their pros and cons (see “The Options,” next page). Despite each plug's unique characteristics, all of these lacrimal occlusion devices are subject to similar considerations for safe and optimal use.

Determine the Cause

Dry eye can be triggered by myriad irritants and conditions, so asking the right questions is key in determining the appropriate course of treatment, said Robert W. Weisenthal, MD, at State University of New York Upstate Medical University, Syracuse.

Patient selection. “The first question I always ask my patients is whether their discomfort is worse in the morning or afternoon. Morning symptoms



EXTRUSION. Patient with pyogenic granuloma. (Left) The pyogenic granuloma that formed after the silicone plug was inserted. (Right) The resulting extrusion of the plug. Note that the granuloma has closed the punctum.

are likely related to lid inflammation or blepharitis. However, if a patient becomes increasingly symptomatic toward the end of the day, it makes me suspect aqueous deficiency dry eye—and someone who is likely a good candidate for punctal plugs,” said Dr. Weisenthal.

Initial treatments. Prior to occlusion, Dr. Weisenthal generally begins treatment for his patients with aqueous-deficient dry eye by advising them to:

- Use artificial tears
- Adjust their environment (e.g., using humidifiers, directing car air vents away from the eyes)
- Avoid systemic medications, such as antihistamines, that exacerbate dry eye

If patients experience improvements

from these changes, they most likely have a mild form of dry eye. However, if they have implemented all the suggested measures and still do not have significant progress, Dr. Weisenthal reassesses the situation. “We can try Restasis, which I start combined with a topical steroid that does not increase pressure to provide more immediate benefit. I do not use a topical steroid alone—only in combination with Restasis. I also propose using punctal plugs because they offer an elegant solution. It is a quick, one-time, easy procedure that eliminates the use of drops except in cases of occasional artificial tear administration,” he said. Some external disease specialists, on the other hand, continue the use of both artificial tears and Restasis with punctal plugs.

Contraindications

Of course, punctal plugs are not suitable for all patients, said Dr. Weisenthal.

BY LESLIE BURLING-PHILLIPS, CONTRIBUTING WRITER, INTERVIEWING SOPHIE X. DENG, MD, PHD, GIACOMINA MASSARO-GIORDANO, MD, AND ROBERT W. WEISENTHAL, MD.

Active ocular disease. He suggests taking an extended look at a patient's eyelids to make sure there is no inflammation, which is indicative of blepharitis or meibomian gland dysfunction. "Using plugs in these cases can exacerbate the inflammation and lead to further discomfort because the abnormal meibum secretions will be bathing the eye due to the obstruction. Treat any underlying conditions and make sure the patient's lids are in good condition before using punctal plugs," he said.

Sophie X. Deng, MD, PhD, said that according to traditional teaching, patients with meibomian gland dysfunction should not receive punctal plugs. Although she agrees with this

perspective for some of her patients, she has found that in other dry eye patients, meibomian gland function actually improves with plugs, as long as the inflammation is first treated and subdued. "If I think dry eye is one of the primary causes of meibomian gland inflammation and ocular surface irritation, I would not hesitate to place a plug. Many patients improve as you continue to treat the meibomian gland disease," she said. Dr. Deng is at the Stein Eye Institute at the University of California, Los Angeles.

Eyelid issues. Patients with dryness due to a lid abnormality are also not good candidates for punctal plugs. This includes those who have loose or floppy

eyelids, which is more common among older patients, those with sleep apnea, and allergy sufferers who frequently rub their eyes, said Giacomina Massaro-Giordano, MD, at Penn Dry Eye and Ocular Surface Center in Philadelphia. She added that the eyelid must be nicely apposed to the eyeball for the plug to work effectively. She recommended "looking carefully at the anatomy of the eyelid—specifically the size and shape. If it is loose or curved outward, a plug will not improve the dryness because the tears cannot find their way to the punctum to drain. Conversely, some patients have chronic inflammation of the conjunctiva. If it is pouching outward or redundant, it may already be

The Options

Three types of plugs are used for treating dry eye: collagen plugs, silicone punctal plugs, and intracanalicular plugs—and each has strengths and weaknesses.

Collagen plugs are often used to provide a short-term therapeutic trial to determine how well occlusion will work. Once inserted into the canaliculus, these plugs dissolve over a period of days, weeks, or months. Dr. Weisenthal does not typically use this type of occlusion because "once the plug is inserted, I can no longer see it, am unable to determine when it dissolved, and therefore cannot get an accurate assessment of its effectiveness." Dr. Massaro-Giordano agreed, adding: "If I need to remove the plug, I want a large enough lip around the perimeter so I can grasp it with a jeweler's forceps, which is not possible with a collagen plug."

Silicone plugs are designed to be permanent and come in multiple sizes and colors depending on the manufacturer. "You can purchase a small probe that can be placed within the punctum to determine the correct size, but I have been performing this procedure long enough that I am able to look at the patient's anatomy and choose accordingly," said Dr. Weisenthal. Dr. Massaro-Giordano recommended making sure that the plug fits snugly, but she warned against selecting the largest size possible because there is a risk of unintentionally expanding the punctum. "I insert the plug, and if it is loose, I can move to the next larger size. If it remains in place when I give it a slight tug, it fits properly," she said.

In addition to "closed-head" plugs, which provide full occlusion, some plugs have a small central opening that essentially reduces the diameter of the patient's punctum. This allows some tears to drain through the opening in the plug's core, further expanding the continuum of treatment options, said Dr. Massaro-Giordano.

Intracanalicular plugs tend to be longer-lasting than collagen or silicone plugs, said Dr. Weisenthal. Use is typically straightforward—simply insert the plug into the canaliculus. Because the entire plug is positioned within the canal, no part of the plug is exposed on the ocular surface, which eliminates the possibility of a foreign body sensation. However, like collagen plugs, intracanalicular plugs cannot be seen once inserted and, therefore, pose similar problems.

Canaliculitis and pyogenic granulomas have also been associated with the use of these plugs, occasionally requiring their surgical removal. One retrospective study reviewed cases of canaliculitis secondary to SmartPlug insertion and found that the prevalence was 7.23% (17 of 235 patients), and the average time from insertion to onset of symptoms was 3 years.¹ All of the affected patients required canaliculotomy and plug removal. Another retrospective study found that canaliculitis, acute dacryocystitis, and tearing occurred due to SmartPlug. Although conservative treatment measures were successful in some patients, canaliculotomy was necessary in 13 and dacryocystorhinostomy with silicone intubation was performed in 4 of the 28 patients.²

Next step: cautery. In some patients, punctal plugs are effective but not quite enough to quell their discomfort. For this group, cautery might be the solution, said Dr. Deng. "There is often the misconception that plugs offer the maximum level of improvement, but I have found that cauterization can further alleviate dry eye by increasing tear retention. I think that a small portion of the tear is still able to drain with the plug present. Once the punctum is cauterized, you can ensure that the opening is 100% closed."

1 Hill RH et al. *Ophthalm Plast Reconstr Surg.* 2009;25(6):437-439.

2 SmartPlug Study Group. *Ophthalmology.* 2006;113(10):1859-1862.



GOOD FIT. The appearance of a silicone plug in the vast majority of patients.

acting as a plug because it is covering up the hole,” she said.

Problems After Plug Insertion

After the plug is properly in place, patients may experience discomfort or even disease. It’s important to watch for the following.

Foreign body sensation. During the first few days after insertion of a silicone punctal plug, patients may notice a foreign body sensation because the mushroom-shaped head of the plug is slightly elevated above the punctum. Most patients adjust to this feeling. However, others may continue to experience discomfort when they look to the side in one extreme or the other, as the plug tip may rub against the cornea. This may be due to the patient’s lower lid anatomy or the use of a larger plug. “This is problematic in about 5% of patients and requires removal of the plug,” Dr. Weisenthal said.

Epiphora. Approximately 10% of patients with punctal plugs and 6.5% of those with intracanalicular plugs experience excessive tearing.¹ This may be viewed as either a positive or negative result, Dr. Deng said. “Because dry eyes can be very irritating, patients sometimes will accept the extra tearing as an equitable trade-off, whereas it can be bothersome for others.”

Conjunctival irritation. The conjunctiva may become irritated in the area adjacent to a silicone plug, although the patient may not notice or complain about discomfort, said Dr. Massaro-Giordano. She stains the patient’s conjunctiva with lissamine green during follow-up visits at 1 month and 6 months because “the plug itself can

cause an abrasion that you would not otherwise observe unless the area is stained,” she said. She usually removes the plug if she sees evidence of irritation.

Extrusion. Spontaneous extrusion is a possibility. When it occurs soon after insertion, it is commonly related to a patient’s anatomy or excessive eye rubbing, said Dr. Massaro-Giordano. “Some people have a slightly kinked opening that can pose a problem, but you will know immediately. When you insert the plug, it should lie flat when the patient blinks and should not bounce around. Typically, if it has not extruded during the first week, it will remain in place for many months or years.” According to the Academy OTA, plug loss (full or partial extrusion, migration) occurred in 40% of punctal plug placements (versus about 5% of intracanalicular plugs).¹

Inflammation. The Academy OTA found that, compared with punctal plugs, intracanalicular plugs have a higher association with pyogenic granuloma and canaliculitis, which were found to occur in 6.0% and 7.8% of patients, respectively; only a minority of those patients required canaliculotomy or dacryocystorhinostomy.¹ According to Dr. Weisenthal, approximately 5% of his patients develop an inflammatory reaction or granuloma from a silicone plug over time, causing it to extrude. “Paradoxically, in some patients, this reaction actually remedies the problem because the punctum becomes completely occluded,” he said.

¹ Marcet MM et al. *Ophthalmology*. 2015;122(8): 1681-1687.

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Dr. Massaro-Giordano is professor of clinical ophthalmology at University of Pennsylvania Scheie Eye Institute and codirector of the Penn Dry Eye and Ocular Surface Center, Philadelphia. *Relevant financial disclosures: Physician Recommended Nutriceuticals: O.*

Dr. Weisenthal is clinical professor of ophthalmology, SUNY Upstate Medical University, Syracuse, N.Y. *Relevant financial disclosure: None.*

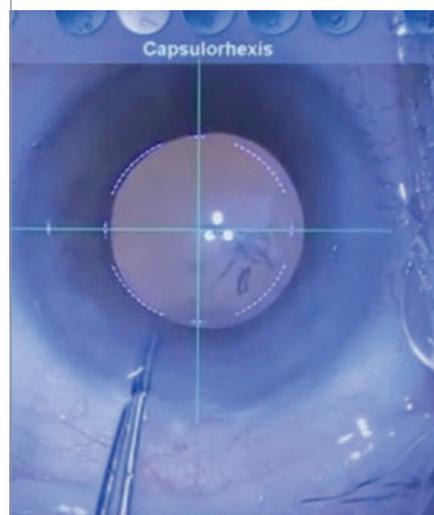
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