

THE UNIQUE CHALLENGES OF DEMODEX BLEPHARITIS



An exploration of the critical aspects of the condition's diagnosis and management.

BY M. AMIR MOAREFI, MD

Blepharitis—a common ocular condition characterized by inflammation of the eyelids—can have various etiologies (see *10 Causes of Blepharitis*). *Demodex* infestation is a significant contributor to blepharitis and affects approximately 25 million individuals in the United States.¹ *Demodex* blepharitis (DB) presents unique challenges for diagnosis and management.¹ This article explores DB's etiology and clinical presentation, diagnostic methods, treatment options, and preventive measures.

RESEARCH ON DB

Limited epidemiologic and demographic data on DB are available, owing in part to diagnostic challenges and a range of reported prevalence rates. Thankfully, a recent emphasis on DB is generating more information.

Demodex mites are ubiquitous and commonly found in the general population. Research using a variety of diagnostic methods has reported prevalence rates ranging from approximately 23% to 100% in adults.² One study found that the prevalence of *Demodex* increased with age; more than 80% of patients older than 60 years of age and 100% of those older than 70 years of age

were affected.³ The statistics are astonishing but reflect my own anecdotal observations in clinical practice.

The incidence of *Demodex* infestation is equal in men and women.⁴ Hormonal factors and differences in facial sebum production between the sexes may contribute to variations in *Demodex* prevalence. Risk factors associated with DB include advanced age, diabetes, poor eyelid hygiene, a compromised immune system, certain systemic conditions (eg, rosacea) and medications (eg, immunosuppressive therapy), and ocular surface disease. Individuals with a history of chronic blepharitis, meibomian gland dysfunction (MGD), or ocular inflammation may be at increased risk of *Demodex* infestation.¹

DB is caused by microscopic parasites, *Demodex folliculorum* and *Demodex brevis*, that infest the eyelids. The parasites preferentially inhabit the hair follicles and sebaceous glands of the eyelids, causing a variety of ocular symptoms and inflammation. Patients who have DB typically present with symptoms such as itching, burning, foreign body sensation, and redness and crusting of the eyelids. Most cases of DB are mild and self-limiting. Moderate to severe disease can lead to complications such as

MGD, punctate epithelial erosions, keratitis, and secondary infection.

DIAGNOSIS

Clinical examination. Although obtaining a thorough patient history is important, a lack of ocular symptoms does not mean that no infestation is present. A comprehensive clinical examination of the eyelids and ocular surface is the first step toward diagnosing DB. Look for eyelid margin abnormalities such as cylindrical dandruff (collarettes), telangiectasia, and thickening. The Titan study, a multicenter retrospective chart review, found that 58% of 1,032 consecutive patients (and 69% of those with a blepharitis diagnosis) presented with collarettes (Figure 1).⁵⁻⁷ It can be helpful to ask patients to look downward during the slit-lamp examination. This exposes the anterior surface of the eyelids, the eyelid margin, and the base of the eyelash hair follicle.

Symptoms. The most common—and most bothersome—symptom associated with DB is ocular itching.^{8,9} *Demodex*-related itching most often occurs at night and early in the morning after periods of mite activity.⁸ The timing helps to distinguish DB from ocular allergy, for which itching is usually worst during

the day. Dry eye and blepharitis patients who have *Demodex* are significantly more likely to report itching than those who do not have the mites, and the frequency of itching complaints increases with higher *Demodex* density.^{1,10} Individuals with dry eye or blepharitis who report itching are 2.6 times more likely to have *Demodex*.¹¹

Visualization. In vivo confocal microscopy allows direct visualization of *Demodex* mites and their movement within the eyelid structures (Figure 2). This noninvasive imaging technique can provide valuable insight into the extent of infestation and help guide diagnosis and treatment decisions.

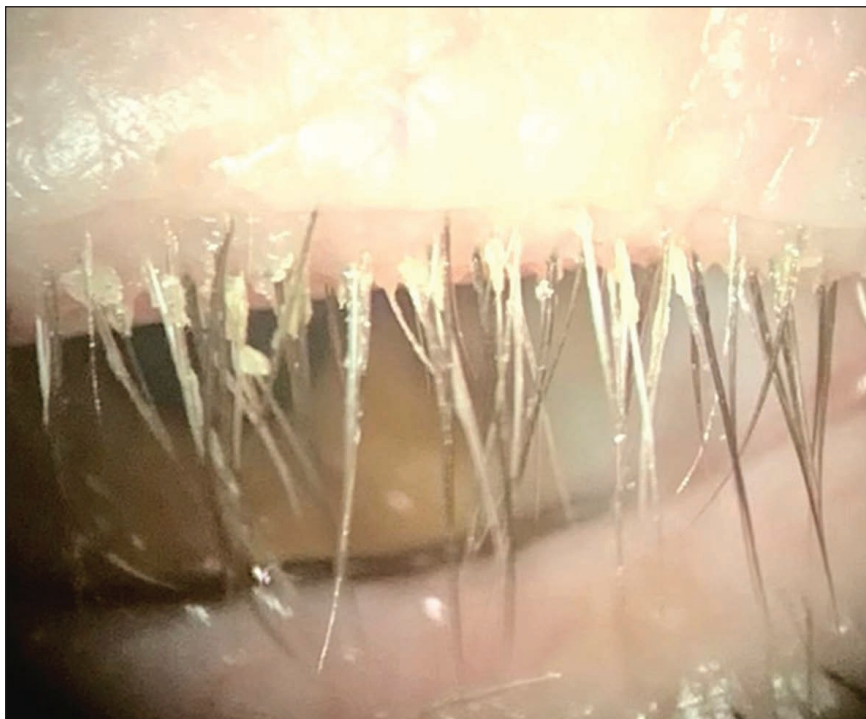
Epilation of the eyelashes followed by a microscopic examination of collected samples can confirm the presence of the mites. This method also allows direct visualization and provides quantitative information about *Demodex* density. Ideally, the epilation of multiple eyelashes from different regions of the eyelid is performed.¹² Unfortunately, this technique is impractical outside of clinical trials.

In my experience, determining the presence or absence of collarettes at the slit lamp often suffices for the diagnosis of DB in clinical practice.

MANAGEMENT

Treatment options. The treatment of DB requires a multifaceted approach. Meticulous lid hygiene is the cornerstone of management. Advise patients to clean their eyelids regularly with warm compresses and gentle eyelid scrubs to remove excess debris, crust, and *Demodex* mites. Several oral, topical, and device-based hygiene options have been evaluated in studies and are in use clinically, but none has been approved by the FDA for the treatment of DB.¹

Historically, various topical agents, such as tea tree oil (TTO) and azithromycin, have been used to



Both images courtesy of Patrick Volmer, MD

Figure 1. Collarettes, the pathognomonic sign of DB, are readily visible at the base of the upper lash margin on downward gaze at the slit lamp.¹



Figure 2. *D. folliculorum* is found on human skin, especially the cheeks, nose, and eyelids.¹

treat *Demodex* mites and temporarily alleviate patients' symptoms. Gels, shampoos, ointments, and lid wipes containing various concentrations (3%–100%) of TTO have been shown to be effective at improving the signs and symptoms of blepharitis.¹³ The products' efficacy for mite eradication, however, remains

uncertain.¹⁴ Products with high concentrations (> 50%) of TTO have greater effectiveness, but they are not considered safe for home use and must be applied in the clinic.¹⁵ Highly concentrated TTO is toxic to the meibomian glands and ocular surface, and it does not completely eradicate *Demodex*.

Refractory or severe DB has traditionally been treated with oral medications such as ivermectin and azithromycin. The medications target the mites systemically to improve control of the infestation, but relief is often temporary. Meibomian gland expression, thermal pulsation therapy, and intense pulsed light therapy have

10 CAUSES OF BLEPHARITIS

Understanding the different causes of blepharitis¹ is crucial for accurate diagnosis and effective management.

NO. 1: STAPHYLOCOCCAL BLEPHARITIS

This condition is usually associated with anterior blepharitis due to staphylococcal bacteria, particularly *Staphylococcus aureus*. Patients with staphylococcal blepharitis frequently present with symptoms such as crusty, red eyelids and irritation along the eyelid margins.

NO. 2: SEBORRHEIC BLEPHARITIS

This form of blepharitis is associated with seborrheic dermatitis, a chronic inflammatory skin condition that can affect the eyelids. Patients with seborrheic blepharitis may exhibit greasy, flaky scales on the eyelid skin as well as redness and itching.²

NO. 3: MEIBOMIAN GLAND DYSFUNCTION

Dysfunction of the meibomian glands contributes to posterior blepharitis. Exam findings include meibomian gland obstruction, altered lipid composition of the tear film, and symptoms of evaporative dry eye disease.

NO. 4: DEMODEX INFESTATION

Demodex mites, specifically *Demodex folliculorum* and *Demodex brevis*, can proliferate within the eyelash follicles and sebaceous glands, leading to *Demodex* blepharitis. Patients may experience itching, burning, redness, and cylindrical dandruff (collarettes) along the base of the eyelashes.³

NO. 5: ALLERGIC BLEPHARITIS

Reactions to environmental allergens such as pollen, pet dander, and cosmetic products (including fake eyelashes) can cause allergic blepharitis. Patients with this condition usually present with itching, tearing, eyelid swelling, and conjunctival injection.

NO. 6: ROSACEA-ASSOCIATED BLEPHARITIS

Patients with rosacea, a chronic inflammatory skin condition, may develop blepharitis as a component of ocular rosacea. These individuals often exhibit ocular irritation, redness, and eyelid telangiectasia.³

NO. 7: CONTACT LENS-RELATED BLEPHARITIS

Prolonged contact lens wear, improper lens hygiene, and allergic reactions to lens materials can all trigger blepharitis. These patients generally present with lens discomfort, red eyes, and papillary conjunctivitis.

NO. 8: MALASSEZIA INFECTION

This genus of yeast-like fungi can contribute to blepharitis, particularly in patients with seborrheic dermatitis. Individuals with *Malassezia* blepharitis may present with greasy scales, erythema, and pruritus along the eyelid margins.

NO. 9: VIRAL BLEPHARITIS

Viral infections, such as herpes simplex virus and varicella zoster virus, can cause viral blepharitis. The presentation of vesicular lesions, pain, and erythema along the eyelid margins, often in a dermatomal distribution, signal a viral etiology.

NO. 10: BACTERIAL INFECTION

In addition to staphylococcal blepharitis, other bacterial infections, such as those caused by *Streptococcus* or *Moraxella*, can cause blepharitis. Patients with bacterial blepharitis may present with an acute onset of symptoms, including eyelid erythema, swelling, and purulent discharge. Sometimes, the condition is also associated with preseptal cellulitis.⁴

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TABLE. KEY CLINICAL TRIAL RESULTS FOR LOTILANER OPHTHALMIC SOLUTION 0.25%

Endpoint	SATURN-1		SATURN-2	
	Active Ingredient	Vehicle	Active Ingredient	Vehicle
Reduction to ≤ 2 collarettes per upper eyelid	44% of patients	7% of patients	55% of patients	12% of patients
Reduction to ≤ 10 collarettes per upper eyelid	81% of patients	23% of patients	89% of patients	33% of patients
Mite eradication	68% of patients	17% of patients	55% of patients	14% of patients
Resolution of erythema	19% of patients	7% of patients	30% of patients	9% of patients

also been employed to complement conventional, conservative treatment by addressing underlying MGD and inflammation.

The recent FDA approval of lotilaner ophthalmic solution 0.25% (Xdemyv, Tarsus Pharmaceuticals) could revolutionize DB management. Most of the other forms of treatment discussed in this article are targeted toward controlling the symptoms caused by mite infestation. In contrast, lotilaner ophthalmic solution acts specifically via mite GABA-gated chloride channels to launch a targeted attack that eventually kills the parasites. The Table shows several key results from the SATURN-1 and SATURN-2 clinical trials.¹⁶ In the trials, the most common adverse reaction was stinging and burning at the instillation site (10% of patients). Of note, no contraindications to treatment with lotilaner ophthalmic solution have been reported.

Prevention. Patient education and compliance play a crucial role in preventing DB recurrence. When

counseling patients, emphasize the importance of consistent lid hygiene practices and adherence to prescribed treatment regimens. Explain that, even after eradication of the mites, reinfestation may occur, requiring treatment. To help prevent DB recurrence, advise patients to avoid the prolonged use of makeup, eyelash extensions, and contaminated cosmetics.

Periodic follow-up visits are essential for monitoring patients' response to treatment, assessing the efficacy of interventions, and identifying signs of disease recurrence and complications. ■

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