

A minor procedure with major implications: eyelid margin hygiene in everyday ophthalmological practice



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HIGHLIGHTS

Eyelid margin hygiene reduces biofilm and inflammation, and improves the tear film and the function of the Meibomian glands. It supports the treatment of ocular surface diseases and preparation for procedures.

ABSTRACT

Blepharitis is one of the most common ophthalmic disorders and represents a significant clinical challenge due to its chronic course, recurrent nature, and frequent coexistence with dry eye disease. Proper eyelid hygiene is a fundamental component of the supportive management of ocular surface diseases, as it facilitates the removal of bacterial biofilm, secretions, desquamated epithelial cells, and allergens, thereby reducing chronic inflammation. In patients with allergic ocular surface diseases, regular eyelid cleansing supports tear film stability, improves meibomian gland function, and alleviates clinical symptoms. In conjunctivitis, eyelid hygiene reduces the microbial burden and promotes restoration of the ocular surface. In the perioperative setting, adequate eyelid preparation improves ocular surface health, reduces microbial colonization, enhances the accuracy of intraocular lens power calculations, and may decrease the risk of postoperative complications, including endophthalmitis. Current evidence indicates that regular eyelid hygiene is a safe, well-tolerated, and effective component of both the prevention and comprehensive management of ocular surface diseases.

Key words: blepharitis, ocular allergy, eyelid hygiene, cataract surgery

INTRODUCTION

Advances in medicine, extensive scientific research, and the development of evidence-based medicine (EBM) are intended to optimize patient treatment outcomes. Currently, evidence-based standards of care are available for nearly every medical condition. One well-characterized disorder is blepharitis. This condition is clinically relevant both as an isolated disease and as a component of other ocular disorders, including conjunctivitis, ocular allergy, chalazia, and hordeola. Recommendations for the management of eyelid dysfunction used in clinical practice are based on guidelines issued by the American Academy of Ophthalmology (AAO), the Polish Ophthalmological Society (PTO), and the European Society of Cataract and Refractive Surgeons (ESCRS).

SCOPE OF THE PROBLEM

Eyelid disorders are among the most common ophthalmic conditions, affecting approximately 50% of ophthalmology patients, and represent a significant clinical problem because of their chronic course, tendency to recur, and negative impact on patients' quality of life [1]. They comprise a broad spectrum of conditions, including blepharitis, meibomian gland dysfunction (MGD), *Demodex* blepharitis, and eyelid malposition disorders. These conditions frequently coexist with dry eye disease and chronic dermatological disorders such as rosacea and seborrheic dermatitis [2]. The most common chronic eyelid disease is blepharitis. It is estimated to account for 37–47% of all diagnoses made by ophthalmologists and optometrists during clinical consultations [3]. Blepharitis is classified into:

1. **Anterior blepharitis** – involving the anterior portion of the eyelid margin, extending to the gray line. Inflammation primarily affects the base of the eyelashes and is associated with excessive bacterial proliferation, particularly *Staphylococcus* spp., seborrheic dermatitis, or *Demodex* infestation. Typical signs and symptoms include redness and swelling of the eyelid margin, scales or crusts at the base of the eyelashes, matting of the eyelashes, itching, burning, foreign-body sensation, tearing, and intermittent blurred vision.
2. **Posterior blepharitis** – involving mainly inflammation secondary to meibomian gland dysfunction (MGD). Typical signs and symptoms include redness of the eyelid margin, foamy secretions along the eyelid margin, burning, stinging, foreign-body sensation, excessive tearing, a sensation of dryness, and intermittent blurred vision, particularly during blinking.

Blepharitis leads to alterations in the microbiome of the eyelids and conjunctiva, including increased colonization by *Staphylococcus aureus* and *Staphylococcus epidermidis*.

These bacteria produce lipases that degrade meibum lipids, as well as toxins, superantigens, and pro-inflammatory factors, thereby contributing to chronic inflammation and tear film instability.

The prevalence of eyelid disorders in the general population remains difficult to determine because of the lack of uniform diagnostic criteria and methodological differences among studies. In an international epidemiological study involving more than 6,500 patients from 11 countries, symptoms or clinical signs of eyelid disease were identified in 78.3% of individuals presenting for routine ophthalmic examinations, underscoring the clinical significance of this problem.

The global prevalence of meibomian gland dysfunction (MGD) is estimated at approximately 35.8%, although it may vary across populations and is higher among older individuals [4]. A growing body of evidence also points to the role of *Demodex* mites (*Demodex folliculorum* and *Demodex brevis*), which may be involved in the pathogenesis of more than 60% of cases of chronic blepharitis [5].

Given their high prevalence, chronic nature, and frequent coexistence with dry eye disease, eyelid disorders require early diagnosis and appropriate treatment. This can help reduce the risk of complications and improve patients' quality of life [6]. The management of blepharitis includes:

1. Eyelid margin hygiene – application of a warm compress with massage at least twice daily for 5–10 min (4 times daily during exacerbations).
2. Removal of secretions from the base of the eyelashes and of liquefied meibomian gland secretions using sterile wipes or a cleansing solution.
3. Regular use of preservative-free lubricating eye drops if symptoms of dry eye disease are present.
4. Topical antibiotic therapy for anterior blepharitis associated with excessive proliferation of streptococcal and staphylococcal flora – erythromycin or bacitracin ointment for 2–8 weeks, or azithromycin eye drops for 3 days.
5. Oral antibiotic therapy for posterior blepharitis that responds inadequately to eyelid hygiene measures alone (doxycycline, minocycline, or azithromycin).
6. Topical anti-inflammatory therapy for dry eye disease associated with blepharitis – preservative-free topical corticosteroids administered 2–4 times daily for 10–14 days, or cyclosporine once daily at bedtime for 1–6 months if corticosteroid therapy is ineffective or contraindicated.

Treatment of *Demodex* infestation includes eyelid margin hygiene using wipes or a cleansing solution to clean the base of the eyelashes 2–4 times daily, together with preparations containing 2–4% terpinen-4-ol applied twice daily for 6–8 weeks. Recent publications have also demonstrated

the efficacy of 0.25% lotilaner; however, this preparation is not available in Poland. Some specialists also recommend ivermectin ointment or cream applied to the base of the eyelashes once daily for 1 month to eradicate *Demodex* mites. Studies also indicate a beneficial adjunctive role for procedures aimed at clearing the meibomian glands, including mechanical expression of the meibomian gland orifices, intense pulsed light (IPL) therapy, and LipiFlow thermal pulsation therapy.

THE ROLE OF EYELID MARGIN HYGIENE IN ALLERGIC OCULAR SURFACE DISEASE

Allergic ocular surface diseases are among the most common ophthalmic disorders, affecting approximately 40% of the population, and comprise a group of conditions characterized by chronic inflammation triggered by hypersensitivity reactions to environmental allergens [7]. Although the primary pathogenetic mechanism involves a Th2 lymphocyte-, immunoglobulin E (IgE)-, mast cell-, and eosinophil-mediated immune response, increasing attention is being paid to changes occurring at the ocular surface and eyelid margins, which may perpetuate inflammation and exacerbate disease symptoms.

In allergic conjunctivitis, allergens, inflammatory mediators, mucus, and desquamated epithelial cells accumulate on the eyelashes and eyelid margins. Chronic itching leads to frequent eye rubbing, resulting in mechanical disruption of the epithelial barrier and increased tissue permeability to allergens and pro-inflammatory mediators. Recurrent episodes of inflammation may also impair meibomian gland function, leading to qualitative changes in meibum, tear film instability, and the development of secondary dry eye disease. Patients with chronic allergic eye disease have been shown to frequently exhibit concomitant signs of meibomian gland dysfunction and blepharitis, which may further exacerbate symptoms.

Treatment is based on eliminating allergens from the patient's environment, the use of lubricating eye drops primarily to reduce the concentration of allergens on the ocular surface, topical antihistamines administered twice daily, preservative-free topical corticosteroids administered 2–4 times daily for 7–14 days depending on symptom severity, and calcineurin inhibitors administered 1–4 times daily [8]. In recent years, the role of cromoglycates in the treatment of ocular allergy has diminished. This change has been driven by studies demonstrating the superiority of antihistamine eye drops with additional mast cell-stabilizing activity, such as ketotifen and olopatadine, over cromoglycates. Regular eyelid margin hygiene has been shown to be an important adjunct to the treatment of allergic ocular surface diseases. Mechanical cleansing of the eyelids helps remove allergens deposited on the eyelashes and eyelid skin and re-

duces the accumulation of mucus, desquamated epithelial cells, and inflammatory secretions. This may limit persistent immune system stimulation by allergens and reduce the local intensity of inflammation. At the same time, proper eyelid hygiene helps maintain patency of the meibomian gland orifices, improves the quality of the tear film lipid layer, and reduces tear evaporation [9]. Current recommendations for the management of allergic ocular surface diseases emphasize the importance of a comprehensive approach that includes not only antiallergic pharmacotherapy but also measures aimed at improving ocular surface health. Eyelid margin hygiene is a safe, well-tolerated, and easy-to-implement adjunctive treatment that may help reduce symptom severity, improve tear film stability, and enhance comfort in patients with chronic allergic eye disease.

Comprehensive management encompassing not only antiallergic pharmacotherapy but also measures aimed at improving ocular surface health. Eyelid margin hygiene is a safe, well-tolerated, and easy-to-implement adjunctive treatment that may help reduce symptom severity, improve tear film stability, and enhance comfort in patients with chronic allergic eye disease.

THE ROLE OF EYELID MARGIN HYGIENE IN CONJUNCTIVITIS

Eyelid margin hygiene is an important adjunctive component in the treatment of conjunctivitis, particularly in chronic or recurrent cases and when conjunctivitis coexists with blepharitis or meibomian gland dysfunction (MGD). The inflammatory process leads to the accumulation of mucus, desquamated epithelial cells, microorganisms, and inflammatory mediators along the eyelid margins, which may perpetuate ocular surface inflammation and disrupt tear film homeostasis [10, 11].

Regular cleansing of the eyelid margins helps mechanically remove bacterial biofilm, reduce the microbial load, and limit tissue exposure to pro-inflammatory factors [12]. In addition, improving the patency of the meibomian gland orifices promotes stabilization of the tear film lipid layer, thereby supporting ocular surface integrity and regenerative processes. Meibomian gland dysfunction and dysbiosis of the eyelid microbiome have been shown to play an important role in sustaining chronic conjunctival inflammation; therefore, eyelid hygiene is now regarded as an important component of comprehensive therapeutic management of ocular surface disease.

EYELID MARGIN HYGIENE IN PERIOPERATIVE PROPHYLAXIS

Appropriate preparation of the ocular surface before ophthalmic surgery is one of the key elements of perioperative

prophylaxis. An increasing body of evidence indicates that eyelid margin disorders, such as blepharitis and meibomian gland dysfunction (MGD), may adversely affect surgical outcomes and increase the risk of postoperative complications. The eyelid margins constitute a natural reservoir of bacteria colonizing the ocular surface. In the presence of chronic inflammation, excessive bacterial colonization, or meibomian gland dysfunction, tear film quality deteriorates, ocular surface inflammation intensifies, and the risk of perioperative infection increases. The literature also highlights an association between untreated blepharitis and the occurrence of postoperative endophthalmitis [13].

This is of particular importance in cataract surgery, refractive surgery, and other procedures involving the anterior segment of the eye. Studies have shown that more than half of patients undergoing evaluation for cataract surgery exhibit signs of meibomian gland dysfunction (MGD), which often remains undiagnosed during routine ophthalmic examination. Untreated MGD may adversely affect surgical outcomes by reducing the accuracy of intraocular lens power calculations, exacerbating postoperative dry eye symptoms, and lowering patient satisfaction with treatment [6]. It is estimated that more than 37% of patients dissatisfied with the outcome of cataract surgery have untreated symptoms of dry eye disease associated with either blepharitis or impaired tear production [14]. According to ESCRS and AAO recommendations, ocular surface disease, including blepharitis and MGD, should be identified and treated before cataract surgery [15]. In patients with abnormalities of the eyelid margin and ocular surface, the cornerstone of management is eyelid margin hygiene for 2–4 weeks before surgery together with treatment of coexisting dry eye di-

sease. This approach is intended to improve ocular surface status, increase the accuracy of biometric measurements, reduce postoperative signs and symptoms of ocular surface inflammation, promote healing, and improve patient satisfaction with the surgical outcome.

The importance of eyelid hygiene during the perioperative period has also been confirmed in clinical studies. In a randomized study involving patients undergoing cataract surgery, eyelid hygiene performed from 3 days before surgery until 1 week after the procedure reduced the severity of blepharitis and meibomian gland dysfunction (MGD) and improved postoperative patient comfort. The authors recommend incorporating eyelid hygiene into standard perioperative management in patients with MGD [16, 17].

CONCLUSIONS

Eyelid margin dysfunction is among the most common ophthalmic disorders. Treatment of eyelid margin disease is indicated in patients with signs and symptoms of blepharitis, meibomian gland dysfunction (MGD), coexisting dry eye disease, recurrent chalazia, or chronic conjunctivitis, as well as in patients scheduled for ophthalmic surgery. In the preoperative period, recommendations from scientific societies emphasize the need to identify and optimize ocular surface status through regular eyelid margin hygiene and etiological treatment tailored to the underlying cause of inflammation. Such management reduces inflammation, improves tear film stability, and increases the accuracy of biometric measurements, thereby contributing to better surgical outcomes and greater postoperative patient satisfaction.

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The content presented in the article complies with the principles of the Helsinki Declaration, EU directives and harmonized requirements for biomedical journals.