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Case Report
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Corneal Phlyctenules as a Complication of Untreated Demodex Blepharoconjunctivitis

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Abstract

Purpose: *To highlight the importance of early detection of demodex infection in young patients to prevent serious complications that can lead to permanent vision impairment.*

Observations: *We are reporting a case of a 13-year-old female who presented to the clinic with redness, photophobia, and itching in both eyes for 7 days. She had no significant past systemic history and was occasionally on Tobradex eye ointment and artificial eye drops. On examination, both eyelids showed marginal hyperemia, redness, and blepharitis; the right eye cornea was clear centrally with peripheral vascularization; the left eye cornea showed two triangular elevated corneal phlyctenules with surrounding neovascularization.*

Conclusions and Importance: *There are no specific management guidelines for demodex associated keratoconjunctivitis. Management of persistent inflammation involves suppressing the inflammatory response and reducing the antigens involved in the inflammatory process. Warm compresses, topical antibiotic ointment, topical steroids, oral antibiotics, and more aggressive topical therapy are recommended. This case report highlights the importance of a thorough clinical examination, immediate identification, appropriate management, and regular follow-up care for Demodex-associated keratoconjunctivitis.*

Keywords: Demodex, Corneal Neovascularization, Blepharokeratoconjunctivitis, Misdiagnosis, Tea Tree Oil.

Introduction

Demodex folliculorum and Demodex brevis are two types of mites that can infest the human eye and have been linked to various ocular diseases, including blepharitis, blepharoconjunctivitis, and blepharokeratitis. They often go undiagnosed and untreated due to similarities with other eye disorders, but lash sampling can provide a definitive diagnosis. The most common treatment is tea tree oil scraps in various doses and concentrations [1].

Demodex folliculorum mainly resides at the base of the lash follicle, where it feeds on follicular and glandular epithelial cells, leading to epithelial abrasions, hyperkeratinization, and hyperplasia. The mites also cause follicular distention and misdirected lashes by laying eggs near the base of the lashes. The undigested matter, regurgitated by the mites due to the lack of excretory systems, combines with keratin, eggs, and epithelial cells to form the cylindrical lash deposits that are characteristic of Demodex infection (collarettes). These deposits contain proteases and lipases, which lead to irritation symptoms. Lid irritation is the only ocular symptom directly connected to Demodex, which is caused by the mites' biting and lipolytic enzymes used to break down sebum, their primary food source [2]. Symptoms of demodex infection can vary from mild eyelid irritation, tearing, and foreign body sensations to severe symptoms and complications that include corneal ulceration, neovascularization, fibrosis, scarring, reduced vision, amblyopia, and secondary infection if there is an epithelial defect. While rare, corneal melting and perforation are potential complications of persistent inflammation [3].

Management involves suppressing the inflammatory response and reducing the antigens involved in the inflammatory process. It often requires a two-pronged approach with both anti-inflammatory and antibiotic therapies. Additionally, warm compresses are recommended for all patients. Most patients (97%) are prescribed topical antibiotic ointment (bacitracin or erythromycin). Other common additional therapies include topical steroids such as dexamethasone, prednisolone, loteprednol, or fluorometholone, and/or one of a variety of oral antibiotics such as macrolides [3].

(Erythromycin or Azithromycin), tetracyclines (doxycycline, tetracycline, or minocycline), or penicillins (amoxicillin/clavulanate or dicloxacillin). Recalcitrant, recurrent, or steroid-dependent cases may benefit from more aggressive topical therapy, such as topical cyclosporine (standard or compounded preparations) or topical tacrolimus.

Long-term maintenance of lid hygiene therapy for any associated chronic blepharitis is another critical component to continued success. In cases of corneal irregularity or residual scarring, the prescription of specialty contact lens designs may optimize visual outcomes. If the corneal scarring is severe, a keratoplasty may also be warranted; however, corneal transplantation in children is challenging. Additionally, any eye prone to inflammation may have an increased risk of transplant rejection [4].

Case report

A 13-year-old female, under regular treatment somewhere else for chronic conjunctivitis, presented to the clinic with redness, photophobia, and itching in both eyes for 7 days. Itching and irritation were associated with a foreign body sensation, redness, and watery discharge. She described episodes of mild pain and blurry vision in both eyes. All symptoms had been present intermittently for the past 6 months but had worsened in the past week. She had no significant past systemic history. She had no known allergies to any food or medication. She was occasionally on Tobradex eye ointment and artificial eye drops.

On examination, both eyelids showed marginal hyperemia, redness, and blepharitis with cylindrical deposits over the base of eyelashes (collarette); the right eye cornea was clear centrally with peripheral vascularization; the left eye cornea showed two triangular elevated corneal phlyctenules with surrounding neovascularization in the temporal and central areas and associated scarring (Figures 1A, C, D).

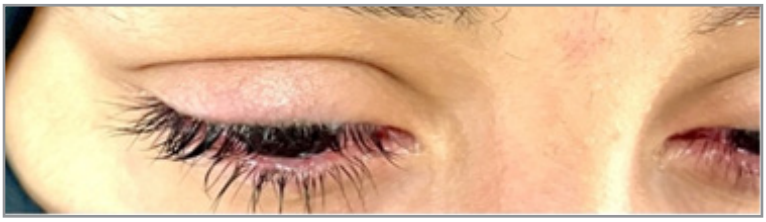

Figure 1 A: First visit photo of the Right eye showing collarettes (pathognomonic of Demodex)

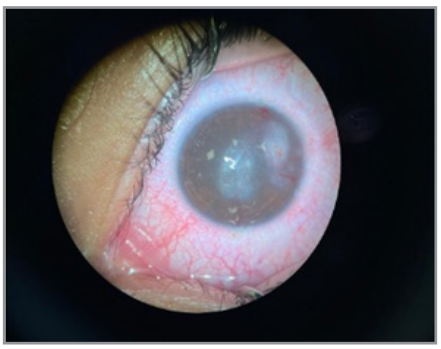

Figure 1 C: Initial presentation of an elevated corneal phlyctenule with surrounding neovascularization and associated scarring, which demonstrates a classic triangular shape

Figure 1 D: Bilateral eye seen at initial presentation with marked blepharoconjunctivitis and photophobia.

An eyelash from the left eye, examined under a microscope, shows Demodex falliculorum. (1B). The patient was diagnosed with Demodex-associated blepharokeratoconjunctivitis. Blepharokeratoconjunctivitis was managed with flouromethalone eye drops, moxifloxacin eye drops, doxycycline capsules 100 mg for 2 weeks, tea tree oil lashes and lid margin scrub, hot compressors, and lid hygiene.

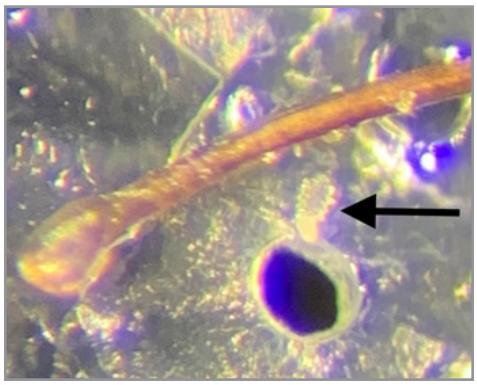

Figure 1 B: Magnified picture of the patient's eyelashes with D. brevis (black arrow), showing the 8 short legs and the two parts of the D. brevis: head and tail (head-neck and body-tail). D. olliculorum can be differentiated from D. brevis by its low head-body ratio of 1:2–1.4, whereas in D. brevis the ratio is almost 1:1, as shown.

During the follow-up visit, patient symptoms of itching, redness, and pain improved minimally. However, the vascularized corneal scarring did not improve, so we decided to go for the left eye corneal MICE procedure (mitomycin intravascular chemoembolization). The procedure was performed under sedation using a 35G needle, with preoperative and postoperative MICE procedures (Figure 2C). On regular follow-up visits, significant conjunctival injections were reduced(Figure 2A). Corneal vascularization, along with the scarring, became fainter (Figure 2B).

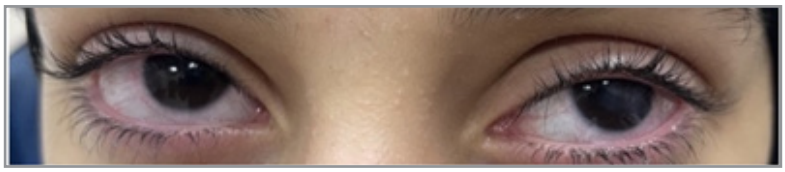

Figure 2 A: Bilateral eyes post-treatment: improved blepharoconjunctivitis.

Figure 2B: Left eye photo 6 months post-MICE procedure showed reduced scar density and vascularization with improved vision.

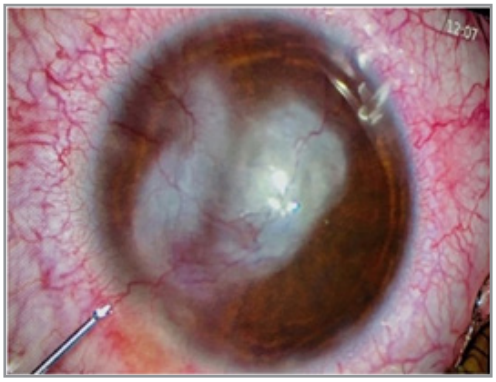

Figure 2C: Left eye, 6 months progressive phlyctenule

Discussion

Demodex-associated Blepharokeratoconjunctivitis is usually diagnosed based on the patient's history, symptoms, and a slit lamp examination. Demodex-associated keratoconjunctivitis is well known to affect the peadiatric age group but is mostly underdiagnosed. If an associated vascularized corneal lesion is found, then several differential diagnoses need to be considered. Clinicians will be able to make the correct diagnosis based on the appearance, onset, staining pattern, and any associated findings. The following conditions are considered differential diagnoses for phlyctenular eye disease: corneal infiltrate, ocular (acne) rosacea keratoconjunctivitis, nodular episcleritis, Salzmann's

nodular degeneration, trachoma pannus, luetic or viral interstitial keratitis, chlamydial conjunctivitis, inflamed pinguecula (pingueculitis), inflamed pterygium, conjunctival intraepithelial neoplasia, limbal vernal keratoconjunctivitis, allergic conjunctivitis, microbial keratitis, marginal ulcer, peripheral ulcerative keratitis, Herpes simplex keratitis , and Ocular Cicatricial Pemphigoid [5-8].

A topical corticosteroid is the treatment of choice for any corneal or conjunctival phlyctenule. In an older case series, six patients with Phlyctenular keratoconjunctivitis (PKC) received topical steroid treatment ranging from 1-4 times daily for 1-4 years [9].A more recent review of PKC found that lower-potency steroids, such as loteprednol and fluorometholone, are frequently sufficient and that dosing is quickly tapered from more frequent to less frequent, followed by a slow taper to as little as once or twice a week to control inflammation.

Steroid treatment not only reduces ocular surface inflammation but also prevents corneal scarring, which can impair vision. It does have a significant risk of side effects, including elevated IOP, cataract formation, corneal melt, and secondary bacterial or fungal infection. Some patients may also become "steroid-dependent," and when anti-inflammatory therapy is discontinued, the condition usually returns within a few months.

Because children are more susceptible to an increase in IOP from topical steroid use than adults, special attention to IOP is required in this population to prevent ocular hypertension. A secondary goal is to avoid corticosteroid-induced glaucoma, which can occur if the ocular hypertensive response is of sufficient magnitude for an extended period and causes optic nerve damage. Because of the risks associated with topical steroids, practitioners try to dose as sparingly and as low as possible. Some studies prefer "soft" steroids like loteprednol etabonate or fluorometholone, especially for long-term therapy [3].

In peadiatric PKC, a multifaceted approach to treatment is recommended, with warm compresses seen as a mainstay of therapy (both for a flare-up and long-term management) and recommended in most cases [2]. Additionally, any bulky debris (eyelid scurf) from anterior blepharitis should be removed with a specialized eyelid wipe or wash once or twice daily. This cleaning prepares the lid for the addition of hypochlorous acid solution spray, a topical preparation with broad-spectrum antimicrobial activity against Staphylococcus aureus and Staphylococcus epidermidis.

Antibiotics, both topical and oral, have been used to treat patients with high levels of bacterial bioburden and inflammation caused by Demodex-associated keratoconjunctivitis [3]. Due to the risk of tooth discoloration, oral tetracyclines such as doxycycline are frequently avoided in peadiatric patients. Pregnant women and people who are allergic to tetracyclines should also avoid taking the drugs. Tetracyclines are still considered by some practitioners for patients older than 10–12 years old, as the medication has been shown in some studies to be effective in the management of PKC in children. A 2016 Cochrane Review found that the approach of prescribing oral antibiotics, including tetracyclines, for PKC was not supported [10, 11].

Conclusion

This case report is intended to highlight the importance of a thorough clinical examination, immediate identification, appropriate management, and regular follow-up care. Prompt recognition of the acute nature of Demodex-associated keratoconjunctivitis disease can stem symptoms and progression, while recognizing its chronic nature can prevent recurrence and limit sequelae. Early recognition and management can help minimize debilitating symptoms and prevent profound vision loss. The discussed case was challenging, demonstrating late presentation, misdiagnosis, and consequent mismanagement. The wide spectrum of the disease's presentation can lead to such scenarios. In addition, there are no specific management guidelines for demodex-associated keratoconjunctivitis.

Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published, and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Authorship

All authors attest that they meet the current ICMJE criteria for Authorship.

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