Severe Allergic Contact Dermatitis of Eyelids: When Topical and Oral Steroids Are Not an Option

Topical calcineurin inhibitors may present a therapeutic option for contact dermatitis of the eyelids.

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A 43 year-old African-American male presented with a two-month history of eye and eyelid irritations. He was previously diagnosed with Floppy Eyelid Syndrome, excessive laxity and redundancy of eyelid tissue often associated with vigorous eye rubbing generally from allergic symptoms; it is analogous to the itch-scratch cycle of atopic patients. Common sequela of Floppy Eyelid Syndrome is the formation of ectropions. A bilateral lower ectropion repair was performed in order to remove excessive tissue. Post procedure bilateral wound dehiscence secondary to eye-rubbing resulted in a second repair. Fissuring of the wound edge was noted at time of the repair.

Post repair, olopatadine eye (Patanol, Alcon) drops for chronic allergic conjunctivitis were prescribed two drops BID daily. Several months later, the patient developed severe pruritis in both eyes. Over-the-counter potassium chloride and tetrahydrozoline hydrochloride (Visine, Johnson and Johnson) three-times daily as well as petrolatum jelly were tried via the patient, but the symptoms worsened.

On presentation, the patient’s vision was 20/20 in both eyes. There was severe edema, erythema, lichenification and hyperpigmentation of all four lids, interrupted by fissuring perpendicular to the lid margin. Two millimeters of lagophthalmos (gap between the upper and lower lids, in the presence of maximum lid closure) was present bilaterally. Corneas were clear and the anterior chambers were quiet. Upon further probing, the patient related having a long standing history of atopic dermatitis that presented with lichenification and pigment changes present in the antecubital fossae and chest. Additionally, the patient had a severe hypertensive episode from oral steroid therapy that required treatment in the emergency department, and therefore oral steroid therapy was not a therapeutic option.

What is your diagnosis? The five most common etiologies of eyelid dermatitis are: Seborrheic dermatitis, psoriasis, irritant contact dermatitis, allergic contact dermatitis, and atopic dermatitis. The latter three are the most relevant given the patient’s history and appearance. Irritant contact dermatitis is a direct consequence of the chemical property of the offending agent, while the other two are T-cell mediated, CD 4(+), prominently Th-2. While the history of previous atopic dermatitis in the antecubital fossae and chest makes atopy likely, part of his presentation suggests an allergic contact component as well, which is not uncommon in patients with severe adult AD. Recent
data in case reports have revealed a correlation in patients with known AD having concurrent allergic contact dermatitis. Conversely, patients previously diagnosed with severe AD that were not responsive to traditional therapy were determined via patch testing to have contact dermatitis. In a clinical study, 33 of 36 individuals identified with AD also had a positive patch test. In individuals with AD, impaired skin barrier and filaggrin dysfunction and transepidermal water loss can predispose them to sensitization by chemicals. In both cases, patients present with a pruritic rash, followed by erythema that may be accompanied by vesicles and bullae. Alternatively, a "dermal" contact dermatitis may develop with erythema without scaling.

The North American Contact Dermatitis Group has identified several common causes of contact dermatitis in the periocular region. Gold was found to be the most common. However, several common compounds used in the eye region are found to be responsible as well, including benzalkonium chloride (BAK), cocomidylpropyl (CAPB) found in baby shampoo, and neomycin sulfate. In this case, both BAK and CAPB exposure were suspected.

**How would you manage this patient?** The usual measures of restricting to dye-, preservative-free products and avoidance of hand-eye contact were instated. For immediate relief, corticosteroid would be appropriate, but in this case the patient was adamantly against it and consideration for increase in ocular pressure should be considered. Symptomatic relief is still crucial in breaking the itch-scratch cycle of eye-rubbing, product-overuse, and tissue inflammation. Therefore, topical tacrolimus 0.1% applied BID was initiated. Tacrolimus ointment is a topical preparation of a macrolide immunosuppressant produced by Streptomyces tsukubaensis. It has been commercially available since 2001, in two strengths: 0.1% and 0.03%. The proposed mechanism of action of tacrolimus is the inhibition of T-lymphocyte activation. Upon penetration of the skin, tacrolimus binds to the macrophillin-12 receptor (FKBP-12). This binding interferes with the formation and phosphorylation of calcium and calmodulin complex. The phosphorylation of calciuncerin is required for the activation and translocation of nuclear factor of activated T-cells (NF-AT). The signaling for an inflammatory cascade produced by pathologic T-cells in the skin is disrupted and prevents the recruitment of proinflammatory cytokines (IL2, IL4, IL-10 and IFNγ). In AD, the T cell dysregulation results in the imbalance of the Th1:Th2 ratio and leads to Th2-dominant response.

Tacrolimus has limited systemic absorption and no influence on intraocular pressure. Systemic absorption of topical agents is influenced by the molecular weight (kDa). The molecular weight of topical agents less than 500 allows for easy penetration of healthy and compromised skin. Tacrolimus molecular weight is 882 kDa, which limits the ability to penetrate a normal skin barrier. While skin is compromised, tacrolimus has the ability to penetrate the skin, however as the skin heals, penetration decreases, limiting the amount of active ingredient exposed to systemic circulation, unlike corticosteroids. The molecular weight of topical steroids is roughly 200kDa, which allows for easy penetration of the skin and systemic absorption.

**Conclusion**

The patient was diagnosed with severe allergic eyelid dermatitis. The patient discontinued any topical preparations and was initiated on tacrolimus 0.1% ointment applied to upper and lower eyelid BID. Symptoms were markedly improved at two weeks and were resolved at six weeks. Eye pressures remained stable throughout treatment. A referral for patch testing was made.

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