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ORIGINAL INVESTIGATION



Non-glaucoma periocular allergic, atopic, and irritant dermatitis at an academic institution: A retrospective review

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ABSTRACT

Purpose: To better understand the nature of periocular dermatitis (PD) patient presentation, treatment, time-to-cure, and referral pattern for allergy testing in an ophthalmic academic center.

Methods: A retrospective chart review of 344 patients diagnosed with PD between January 1, 2000 and November 30, 2016 at the Edward S. Harkness Eye Institute was performed. Eighty patients were eligible for the study. The primary endpoint was the time-to-cure. Cox proportional hazards regression was performed to assess if there was a significant difference between time-to-cure in patients treated with: 1) combination topical steroid/antibiotic ($n = 6$) vs. topical steroid alone ($n = 40$) and 2) combination topical steroid and oral antihistamine ($n = 5$) vs. topical steroid alone ($n = 40$).

Results: The median age of eligible patients was 57.69 years old, 66.25% of patients were female, and 41.25% had a history of atopy. Seven patients in total were referred for allergy testing. A significant difference was found in likelihood of cure when comparing combination topical steroid and oral antihistamine versus topical steroid alone, adjusting for age and gender (aHR = 3.97, 95% CI: 1.40–11.25). No significance was found when comparing combination topical steroid/antibiotic versus topical steroid alone (aHR = 1.96, 95% CI: 0.72–5.27).

Conclusion: Patients treated with topical steroid and oral antihistamine were approximately 4 times more likely to experience cure in comparison to patients treated with topical steroids alone. While the majority of patients were not referred for formal allergy testing, this would likely be of benefit.

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Allergy testing; periocular dermatitis; time-to-cure; topical steroid

Introduction

Eyelid skin is particularly susceptible to periocular dermatitis (PD) because it is one of the thinnest cutaneous areas of the body, making it sensitive to allergen penetration.¹ There are multiple causes of PD, including allergic contact dermatitis (ACD), atopic dermatitis (AD), and irritant contact dermatitis (ICD).² The most common cause of PD is ACD, ranging from 32 to 77% of PD diagnoses.^{3–6} ACD is induced by contact allergens, resulting in delayed-onset type IV hypersensitivity mediated by cutaneous T cells. In ophthalmologic patient populations the preservatives used in glaucoma medications are often the contact allergens resulting in ACD.⁷ Patients with ACD frequently present with erythema, edema, pruritus, and coalescing edematous papules. AD is another common cause of PD, responsible for 10 to 39% of PD diagnoses.^{2,4,5,8–12} AD is characterized by a “leaky” epithelial barrier due to mutations in important structural proteins, such as filaggrin, predisposing patients to allergen

sensitization and susceptibility to microbial infection.^{13,14}

Patients with AD present with erythematous symmetric plaques on the upper eyelids that are intensely pruritic. Other associated features include “allergenic shiners,” Dennie-Morgan lines, allergic rhinitis, and asthma. Chronic ACD and AD are often clinically indistinguishable, with erythema, scaling, and thickening seen in both diseases, and biopsy results are commonly nonspecific.² Contrary to ACD and AD, ICD is the result of physical, mechanical, and/or chemical injury to the skin. ICD of the periorbital region is estimated to occur in 8 to 21% of PD patients.^{2,6,15,16} Often the irritant will result in burning of the skin, distinguishing it from ACD, though clinically it can mirror ACD and AD, and patients may not be able to identify the inciting exposure.

In order to distinguish subtypes and triggers of PD, patients often require further work-up through formal allergy testing. This is especially true when there is suspected contact allergy or potential for a delayed

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hypersensitivity reaction to a systemic allergen, including ingested or environmental exposures.⁸ The treatment options for PD depend on the specific etiology. They include avoidance of environmental and/or contact allergens, as well as the application of low-potency topical steroids, topical calcineurin inhibitors (tacrolimus or pimecrolimus), emollients, topical or oral antibiotics for secondary infections, and topical or oral antihistamines to decrease associated pruritus.⁵ Despite the fact that this condition affects the periocular region, literature on PD is often presented from the dermatologic or allergist perspective. However, few studies assess potential differences between treatment regimens, and these studies do not assess differences in treatment based on time-to-cure.^{17–19}

This retrospective study was designed to better understand the nature of PD patient presentation, treatment, referral pattern, likelihood of cure, and time-to-cure in an ophthalmic academic center.

Materials and methods

A retrospective chart review of 344 patients diagnosed with PD between January 1, 2000 and November 30, 2016 at the Edward S. Harkness Eye Institute was performed. Inclusion criteria were defined as patients presenting with dryness, scaling, erythema, swelling, and/or crusting of the eyelid skin at the time of presentation. Exclusion criteria included contact dermatitis due to eye drops or eyelid findings due to diseases such as psoriasis and discoid lupus erythematosus. Although glaucoma medications are one of the most common exposures resulting in ACD, our study aimed to elucidate other environmental and contact exposures that are implicated in the pathogenesis of PD, as glaucoma drop-caused PD is both easily identifiable and rectifiable.⁷ Billing codes were used to identify potential subjects, after which chart review was performed to select for patients meeting the inclusion and exclusion criteria. This retrospective review was approved by the institutional review board and conducted in a manner that complied with the Health Insurance Portability and Accountability Act.

Eligible charts were reviewed for demographic data (age, gender), medical and ophthalmic history, physical exam, treatment, and time-to-cure. Pertinent history and presenting symptoms included atopy (asthma, eczema, allergic rhinitis), potential contact exposure (nail polish, makeup, laundry detergent, etc.), periocular dryness, itchiness, burning, scaling, swelling, irritation, redness, tearing, and past therapeutic regimens. Pertinent physical exam findings included periocular skin dryness, thickening, swelling, scaling, erythema, excoriation, crusting, flaking, eczematous changes, and dermatitis. Additional

data collected included medication prescribed on the initial visit, referral to dermatology and/or allergy specialists, allergy testing, and duration (in days) from diagnosis to cure.

Time-to-cure was defined as the number of days from the initial visit to the last visit at which there were no symptoms nor signs of PD. Patients were followed as determined by the treating physician. Patients who presented for one visit only (subsequently lost to follow-up) were considered to have time-to-cure equivalent to the median time among patients fully followed, which was 46.0 days ($n = 63$). In addition to descriptive statistics, cox proportional hazard modeling was performed to determine if there was a difference in likelihood of cure based on treatment regimen. Treatment groups were as follows: 1) topical steroid alone (fluoromethalone 0.1% ophthalmic ointment, loteprednol etabonate ophthalmic ointment (Lotemax), or hydrocortisone cream); 2) topical steroid/antibiotic combination therapy [dexamethasone/neomycin/polymyxin B ointment (Maxitrol) or tobramycin/dexamethasone (Tobradex)]; and 3) topical steroid and oral antihistamine combination therapy. The significance threshold was set at $p \leq 0.05$. In all such analyses, two assumptions were made; in one, patients who were lost to follow-up were censored, and in the other, these patients were non-censored (considered treatment successes).

Results

After applying our inclusion and exclusion criteria, 80 patients were eligible for the study. Refer to [Table 1](#) for baseline patient demographic information, medical history, and presenting clinical features. The median age at presentation was approximately 58 years old and 66.25% of patients were female. History of atopy was common, with 41.25% of patients reporting a history of asthma, allergic rhinitis, or atopic dermatitis. In total, 50% of patients reported feeling itchiness of the eyelids, 45% reported redness and 32.5% of patients reported swelling around the eyes. The most common physical exam findings included dryness/flaking/scaling of the skin and erythema, with 36.25% of patients presenting with each finding. Due to the clinical similarities between patients presenting with various forms of PD, particularly ACD and AD, and limited patient follow-up data, sub-classifications of PD could not accurately be made retrospectively.

The most commonly prescribed treatment regimens are presented in [Table 2](#). Fluorometholone 0.1% ophthalmic ointment was the most popular, with 33.75% of patients treated with this medication alone. Other treatments included loteprednol etabonate ophthalmic ointment (13.75%), and hydrocortisone cream (2.5%).

Table 1. Patient demographic and clinical characteristics.

	Results
Age, years	
Mean $\pm$ SD	55.48 $\pm$ 18.88
Median	57.69
Gender, n (%)	
Male	27 (33.75)
Female	53 (66.25)
Medical and ophthalmic history, n (%)	
Atopy (allergic rhinitis, asthma, atopic dermatitis)	33 (41.25)
Contact exposure (nail polish, makeup, laundry detergent)	16 (20.0)
Symptoms, n (%)	
Itchiness	40 (50.0)
Redness	36 (45.0)
Swelling	26 (32.5)
Tearing	16 (19.51)
Irritation	13 (16.25)
Dryness	12 (15.0)
Scaling/scaly/cracked skin	11 (13.75)
Physical exam findings, n (%)	
Dryness/flaking/scaling	29 (36.25)
Erythema/redness	29 (36.25)
Swelling	21 (26.25)
Conjunctival reaction	18 (22.5)
"Dermatitis"	16 (20.0)
"Eczematous"	15 (18.75)
Excoriation	8 (10.0)
Thickening	7 (8.75)
Crusting	3 (3.75)

Quotations indicate the finding is as written in the chart. SD: standard deviation.

Steroid/antibiotic combination therapy was used to treat 7.5% of patients, consisting of dexamethasone/neomycin/polymyxin B alone (5.0%) or tobramycin/dexamethasone alone (2.5%). One patient was treated with tacrolimus 0.1% ointment. Treatments more often used in combination therapy regimens included oral antihistamine, hydrocortisone cream, emollients, and oral steroids.

Twenty patients (25.0%) were counseled on avoiding contact exposure to various products, including makeup (eyeliner and eyeshadow), nail polish, creams, latex, glues, metals (cobalt and nickel) and eyeglass frames. Fourteen patients (17.5%) were counseled on proactive environmental changes, such as changing bedsheets, laundry detergents, and pillows.

Three patients underwent eyelid skin biopsies, all of which exhibited non-specific spongiotic dermatitis histopathologically. Refer to Table 3 for patient referrals. Of note, 10 patients (12.5%) were referred to an allergist, 6 patients (7.5%) were referred to a dermatologist, and 2 patients (2.5%) were referred to both. In total, 7 patients (8.75%) went for allergy testing. Skin prick test (SPT) was performed on 3 patients (3.75%), yielding reactions to ragweed in one patient; dog dander, cat dander, and dust mites in a second; and a negative test for the third. Patch testing was performed on 4 patients (5.0%), yielding reactions to a cosmetic preservative (iodopropynyl butylcarbamate) in one patient; nickel sulphate, cobalt chloride, fragrance mix I, cosmetic preservatives (quaternium-15), cosmetic products (L'dara anti-aging serum, Garnier fructis daily care shampoo 2 in 1), mercapto mix and gold in another; and negative testing for two patients.

Cox proportional hazards regression was performed to assess if there was a significant difference between time to cure in patients treated with: 1) combination topical steroid/antibiotic ($n = 6$) vs. topical steroid alone ($n = 40$) and 2) combination topical steroid and oral antihistamine ($n = 5$) vs. topical steroid alone ($n = 40$). Ten patients

Table 2. Single and combination therapies used to treat patients with periocular dermatitis.

Treatment regimen	Single and combination therapies, n (%)**	Initial dosage and frequency	
		Average dose, duration (days)	Range
Fluoromethalone 0.1% ophthalmic ointment*	27 (33.75)	2x/day (19)	1-4x/day (3-42)
Hydrocortisone cream	3 (3.75)	2x/day (unknown)	2x/day (unknown)
Oral antihistamine	2 (2.5)	As needed	As needed
Hydrocortisone cream + oral antihistamine	1 (1.25)	Unknown	Unknown
Oral steroid (prednisone)	1 (1.25)	20 mg 3x/day (3), 2x/day (3), 1x/day (1)	Unknown
Emollient	1 (1.25)	2x/day (21)	Unknown
Loteprednol etabonate ophthalmic ointment	11 (13.75)	2.15x/day (23)	1-4x/day (3-42)
Emollient	1 (1.25)	As needed	As needed
Hydroxylpropyl methylcellulose gel	1 (1.25)	1x/day (42)	Unknown
Oral antihistamine	1 (1.25)	As needed	As needed
Dexamethasone/neomycin/polymyxin B ophthalmic ointment	4 (5.0)	2x/day (16)	2x/day (7-31)
Oral antihistamine	1 (1.25)	1x/day (14)	Unknown
Hydrocortisone cream	2 (2.5)	2x/day (11)	2x/day (7-15)
Oral antihistamine	1 (1.25)	Unknown	Unknown
Emollient	1 (1.25)	Unknown	Unknown
Oral antihistamine	2 (2.5)	As needed	Unknown
Hydroxylpropyl methylcellulose gel	2 (2.5)	As needed	As needed
Tobramycin/dexamethasone ointment	2 (2.5)	2x/day (7)	2x/day (7)
Emollient (Vaseline/Aquaphor)	1 (1.25)	As needed	As needed

*Therapies used alone are listed in bold; therapies used in combination are listed below them (where applicable).

**14 patients received no pharmacologic treatment. Among them, 3 patients were managed with cool compresses only for symptomatic relief, 3 patients with avoidance of contact exposure (e.g. makeup, nail polish, etc.), 2 patients with environmental changes (e.g. change bedsheets, pillows, laundry detergents, etc.), 2 patients with both avoidance of contact exposures and environmental changes, and 4 patients with no initial therapy or behavioral changes.

Table 3. Patient referral patterns.

Referral to specialist	n (%)
Allergy and immunology	10 (12.5)
Dermatology	6 (7.5)
Allergy and dermatology	2 (2.5)
Allergy testing ^a	7 (8.75)
Skin prick test	3 (3.75)
Patch test	4 (5.0)

^aPatients referred to allergy testing and allergy and immunology may overlap.

were lost to follow-up after their initial visit. Therefore, two separate scenarios were run in each analysis. In the first, data from patients who were lost to follow-up after their initial visit was censored. In the second, this data was included, therefore assuming that all symptoms were resolved. A summary of the comparisons between treatment groups can be found in Table 4, and Kaplan-Meier survival curves for treatment regimens are shown in Figure 1.

When comparing combination topical steroid/antibiotic to topical steroid alone, the crude hazard ratio (HR) for cure in the censored group was 2.06 (95% confidence interval [CI]: 0.78–5.46). When adjusting for age and gender, the HR is 1.96 (95% CI: 0.72–5.27). In the non-censored group, the crude HR was

1.71 (95% CI: 0.71–4.09), and the adjusted HR was 1.61 (95% CI: 0.66–3.94). However, in both the censored and uncensored groups, the hazard ratios were not statistically significant.

When comparing combination topical steroid and oral antihistamine to topical steroid alone, both censored and uncensored data demonstrate a significant improvement in the likelihood of a cure in the combination group. In the censored group, the crude HR was 3.62 (95% CI: 1.34–9.82) and adjusted HR was 3.97 (95% CI: 1.40–11.25). In the non-censored group, the crude HR was 2.79 (95% CI: 1.07–7.30) and the adjusted HR was 2.99 (1.09–8.17). Furthermore, a third analysis was run in which we excluded patients who presented only once. In this analysis, the crude HR was 2.95 (95% CI: 1.10–7.93) and the adjusted HR was 3.26 (95% CI: 1.54–9.22). Statistical significance was found in all cases.

Descriptive statistics separated by treatment regimen are presented in Table 5. Itchiness and erythema were the most common symptoms and exam findings, respectively, in each of the three treatment groups. The median time-to-cure for treatment groups were as follows: 46 days for patients treated with topical

Table 4. Comparison of cure, based on treatment regimen.

Group	Analysis type	HR ^a (95% CI)	p-value	aHR ^b (95% CI)	p-value
Group 1 ^c	Censored	2.06 (0.78–5.46)	0.15	1.96 (0.72–5.27)	0.19
	Non-censored	1.71 (0.71–4.09)	0.23	1.61 (0.66–3.94)	0.3
Group 2 ^d	Censored	3.62 (1.34–9.82)	0.01	3.97 (1.40–11.25)	0.01
	Non-censored	2.79 (1.07–7.30)	0.04	2.99 (1.09–8.17)	0.03

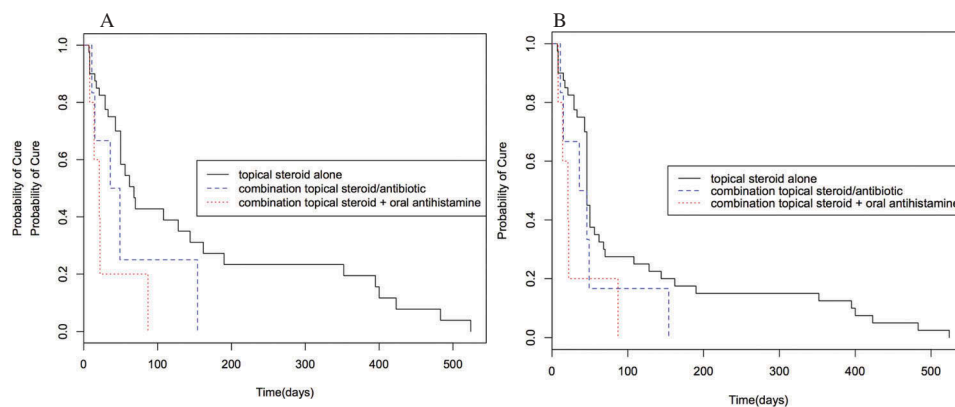
HR = hazard ratio. CI = confidence interval. aHR = adjusted hazard ratio.

^aHR is not adjusted for age and gender (crude).

^baHR is adjusted for age and gender.

^cGroup 1 = combination topical steroid/antibiotic vs. topical steroid alone.

^dGroup 2 = combination topical steroid and oral antihistamine vs. topical steroid alone.

**Figure 1.** Kaplan-Meier (KM) curves representing probability of cure vs. time (days) according to treatment regimens.

A) KM curve in which patients lost to follow-up are considered censored B) KM curve in which all patients are assumed to experience the event of cure (resolution of symptoms and signs of PD). In both analyses, the combination therapy groups have large vertical drop-offs in probability of cure due to a limited sample size. The KM curves for both the censored and non-censored analyses depict the median survival time—the point at which the KM curves cross probability of cure = 0.5, projected down to the x-axis.

Table 5. Analysis of patient groups treated with topical steroids alone vs. steroids in combination with antibiotics, or in combination with oral antihistamine.

Treatment, n	Median age, years	History of atopy, n (%)	Symptoms and physical exam findings, n (%)	Median time-to-cure, days*	Allergy testing, n (%)
Steroid alone, 40	57.56	14 (35)	Itchiness, 21 (52.5) Erythema, 11 (27.5) Scaling, 10 (25)	Censored group, 53 Non-censored group, 46	2 (5)
Combination steroid/antibiotics, 6	55.64	2 (33.3)	Erythema, 3 (50) Itchiness, 2 (33.3) Swelling, 2 (33.3)	Censored group, 36 Non-censored group, 41	-
Combination steroid/oral antihistamine, 5	55.85	3 (60)	Itchiness, 4 (80) Swelling, 3 (60) Erythema, 2 (40)	Non-censored group, 21	3 (60)

*Median time-to-cure incorporated values for both censored and non-censored analyses. Anyone lost to follow-up (in the censored analysis) was not included in the median time-to-cure computation. The combination topical steroid and oral antihistamine group had no patients lost to follow-up, and thus only had a non-censored group of patients in the time-to-cure column.

steroid alone; 41 days for patients treated with combination topical steroid/antibiotic; and 21 days for patients treated with combination topical steroid and oral antihistamine. Additionally, patients treated with combination topical steroids and oral antihistamines were more likely to experience cure at any given point in time, as noted by the cox proportional hazards analysis above.

Discussion

In this retrospective review of 80 patients, 41.25% of patients had a history of atopy and 20% of patients had a history of contact exposure. Although 18 patients total were referred to outside specialists (allergist, dermatologist, or both), only seven were sent for formal allergy testing; this highlights the distinction between theory and practice. Additionally, the majority of patients who presented with PD were female. One potential explanation for the female preponderance is that females are more likely to be exposed to contact allergens such as makeup, nail polish, eyeshadow, topical creams, and fragrances, all of which have been implicated in ACD of the eyelids.^{3,12,20}

The most common subjective complaints were redness, itching, and swelling. The most common physical exam findings were dryness/flaking/scaling, erythema, and swelling. As stated previously, these findings in and of themselves do not allow for precise PD subclassification into ACD, AD, or ICD groupings. For this reason, treating physicians used clinical discretion regarding whether to recommend environmental changes, avoidance of a specific irritant, or further allergy testing.

This study found that patients treated with combination topical steroid and oral antihistamines were nearly four times more likely to experience cure in comparison to patients treated with topical steroids alone. One

potential explanation for this finding is that oral antihistamines decrease associated pruritus, scratching and irritation, while topical steroids target the inflammatory component of the disease. This combination may break a patient-potentiated cycle of scratching, resulting in decreased inflammation and skin breakdown. This may explain why patients treated with combination topical steroid and oral antihistamine had a median time-to-cure 54% less than that of the topical steroid alone group. It is of note that 3 out of 5 patients (60%) treated with combination topical steroid/oral antihistamine experienced itching on presentation, whereas only 21 of 40 patients (52.5%) treated with topical steroid alone experienced itching. The preponderance of itching as a presenting symptom in this subgroup of patients likely explains why these patients were prescribed oral antihistamines in the first place, though the greater than 50% of patients with itching in the topical steroid alone group may have benefited from oral antihistamine therapy as well. Importantly, 3 out of the 5 patients (60%) treated with topical steroid and oral antihistamines were sent for allergy testing. In contrast, only 2 out of 40 patients (5%) treated with topical steroids alone were referred for allergy testing. Though there was a small number of patients treated with combination topical steroid and oral antihistamine, those who underwent allergy testing may have discovered their inciting environmental allergens. Avoidance of such allergens may have allowed for decreased burden of disease. Ophthalmologists who encounter patients with recurrent eyelid itching, history of atopy or exposure to contact allergens, and findings consistent with PD, should have a low threshold for patient referral to formal allergen testing, as these patients are likely suffering from ACD or AD.

In this dataset, patients treated with combination topical steroid/antibiotic were no less likely to experience cure in comparison to patients treated with topical steroids

alone (HR 1.96, 95% CI: 0.72–5.27). The lack of statistical significance may be attributed to under-powered data. However, this conclusion is consistent with two studies comparing topical steroid-antimicrobial combination to topical steroid alone in the treatment of systemic atopic dermatitis, in which both found no difference in clinical outcomes between the two groups.^{21,22} Furthermore, it is not clear whether topical steroid/antibiotic combinations such as tobramycin/dexamethasone should be used for PD, given that there have been cases of tobramycin inducing ACD.²³

Our study had important similarities and differences compared to a recently published retrospective review investigating allergic eyelid dermatitis.⁷ Similar to our findings, this study found three common presenting symptoms among patients were irritation/itching/burning, redness of eyelid skin, and tearing. Furthermore, the authors found a majority of their patients were comprised of women. Given they identified topical creams/lotions and cosmetics as the inciting factors in over one third of the cases, these products appear to play a large role in PD and may explain the predilection of the disease in women. The most common physical exam findings in their review were eyelid margin inflammation, eyelid skin inflammation, and conjunctival reaction. Though our findings of erythema and edema are consistent with eyelid inflammation, we had only 22.5% of patients presenting with conjunctival reaction as compared to their 57.4%. This may be explained by our exclusion of patients with dermatitis due to glaucoma eye drops. The authors noted that 82% of patients on glaucoma medications had conjunctival reaction, compared to only 33% of those using topical lotions—a statistically significant difference. A majority of patients in their review had resolution of their symptoms when removing the suspected offending agent and being treated with a short course of topical steroids. As almost one third of patients presented with dermatitis due to glaucoma medications, this may be a more easily identifiable and treatable etiology of PD. In comparison, our exclusion and inclusion criteria identified patients with non-medication induced dermatitis, which may be more difficult to identify and treat without formal allergy testing. Moreover, though it could simply be a difference in treatment practice, oral antihistamines were not part of the standard treatment protocol used by the authors. Interestingly, they note that rubbing/manipulation was an important factor in 30% of patients on presentation. This finding helps to confirm our suspicion that a topical steroid and oral antihistamine may work together to break scratching-induced inflammation. Among the eight patients referred for allergy testing in this study, four were

allergic to gold, two to fragrances, one to zinc, and one had a negative test. In contrast, our study identified two patients with environmental allergens (e.g. ragweed, animal dander, and dust mites). Moreover, only one patient in our study was identified to have gold allergy whereas other heavy metal allergies were identified in another patient (e.g. cobalt and nickel).

Due to its retrospective nature, this study has important limitations. First, stringent inclusion and exclusion criteria may have resulted in an insufficient sample size for comparisons of statistical significance. Additionally, since this was a retrospective review, data were limited to that which was documented at the time of patient interaction, and subgroups of treatment were not equally balanced. This is particularly notable in the case of topical tacrolimus, an increasingly prevalent therapy in the treatment of PD, which was only used for 1 patient. Similarly, given the retrospective nature, assumptions regarding time-to-cure equaling the day from diagnosis to the ophthalmologic visit at which there were no symptoms or signs of eyelid dermatitis may not precisely gauge resolution time. Assumptions regarding lack of follow-up were made in order to be able to analyze the data. Time-to-cure may be confounded by the subset of patients treated with antihistamines and referred for allergy testing. These patients may have had a faster resolution of their PD given a pronounced allergic presentation, leading the provider to refer them for allergy testing and empirically start them on antihistamines to decrease associated pruritus. Going further, patients who were lost to follow-up were assumed to have median time-to-cure of patients fully followed. However, in all likelihood, patients who were lost to follow-up had faster cure time. To accommodate for this, we compared data incorporating loss to follow-up and no loss to follow-up. Finally, different subtypes of PD were not able to be clearly distinguished due to the overlapping clinical pictures, limited allergen testing, and limited patient follow-up information as to whether avoidance of allergens resulted in clinical improvement.

To conclude, this study provides a better understanding of a PD patient's likely time-to-cure, presents evidence for the use of combination topical steroid and oral antihistamine therapy, and emphasizes the need for and benefit of formal allergen testing. Future studies would benefit from a prospective comparison of combination topical steroid and oral antihistamine versus non-combination therapy, as well as patient PD recurrence after formal allergen testing.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

1. Pratchyapruit W, Kikuchi K, Gritiyarangsana P, Aiba S, Tagami H. Functional analyses of the eyelid skin constituting the most soft and smooth area on the face: contribution of its remarkably large superficial corneocytes to effective water-holding capacity of the stratum corneum. *Skin Res and Technol.* 2007;13(2):169–175. doi:10.1111/j.1600-0846.2007.00183.x.
2. Zug KA, Palay DA, Rock B. Dermatologic diagnosis and treatment of itchy red eyelids. *Surv Ophthalmol.* 1996;40:293–306.
3. Nethercott JR, Nield G, Holness DL. A review of 79 cases of eyelid dermatitis. *J Am Acad Dermatol.* 1989;21:223–230.
4. Guin JD. Eyelid dermatitis: a report of 215 patients. *Contact Dermatitis.* 2004;50(2):87–90. doi:10.1111/j.0105-1873.2004.00311.x.
5. Temesvári E, Pónyai G, Németh I, Hidvégi B, Sas A, Kárpáti S. Periocular dermatitis: a report of 401 patients. *J Eur Acad Dermatol Venereol.* 2009;23(2):124–128. doi:10.1111/j.1468-3083.2008.02949.x.
6. Feser A, Plaza T, Vogelgsang L, Mahler V. Periorbital dermatitis—a recalcitrant disease: causes and differential diagnoses. *Br J Dermatol.* 2008;159(4):858–863. doi:10.1111/j.1365-2133.2008.08790.x.
7. Chisholm SAM, Couch SM, Custer PL. Etiology and management of allergic eyelid dermatitis. *Ophthalm Plast Reconstr Surg.* 2017;33(4):248–250. doi:10.1097/IOP.0000000000000723.
8. Landeck L, Schalock PC, Baden LA, Gonzalez E. Periorbital contact sensitization. *Am J Ophthalmol.* 2010;150(3):366–370.e2. doi:10.1016/j.ajo.2010.03.026.
9. Herbst RA, Uter W, Pirker C, Geier J, Frosch PJ. Allergic and non-allergic periorbital dermatitis: patch test results of the Information Network of the Departments of Dermatology during a 5-year period. *Contact Dermatitis.* 2004;51(1):13–19. doi:10.1111/j.0105-1873.2004.00334.x.
10. Guin JD. Eyelid dermatitis: experience in 203 cases. *J Am Acad Dermatol.* 2002;47:755–765.
11. Cooper SM, Shaw S. Eyelid dermatitis: an evaluation of 232 patch test patients over 5 years. *Contact Dermatitis.* 2000;42:291–293.
12. Valsecchi R, Imberti G, Martino D, Cainelli T. Eyelid dermatitis: an evaluation of 150 patients. *Contact Dermatitis.* 1992;27:143–147.
13. Irvine AD, McLean WH, Leung DY. Filaggrin mutations associated with skin and allergic diseases. *N Engl J Med.* 2011;365(14):1315–1327. doi:10.1056/NEJMra1011040.
14. Elias PM, Steinhoff M. “Outside-to-inside” (and now back to “outside”) pathogenic mechanisms in atopic dermatitis. *J Invest Dermatol.* 2008;128(5):1067–1070. doi:10.1038/jid.2008.88.
15. Amin KA, Belsito DV. The aetiology of eyelid dermatitis: a 10-year retrospective analysis. *Contact Dermatitis.* 2006;55(5):280–285. doi:10.1111/j.1600-0536.2006.00927.x.
16. Ayala F, Fabbrocini G, Bacchilega R, et al. Eyelid dermatitis: an evaluation of 447 patients. *Am J Contact Dermat.* 2003;14(2):69–74.
17. Freeman AK, Serle J, VanVeldhuisen P, et al. Tacrolimus ointment in the treatment of eyelid dermatitis. *Cutis.* 2004;73(4):267–271.
18. Mensing CO, Mensing CH, Mensing H. Treatment with pimecrolimus cream 1% clears irritant dermatitis of the periocular region, face and neck. *Int J Dermatol.* 2008;47(9):960–964. doi:10.1111/j.1365-4632.2008.03634.x.
19. Nivenius E, Van Der Ploeg I, Jung K, Chrysanthou E, Van Hage M, Montan PG. Tacrolimus ointment vs steroid ointment for eyelid dermatitis in patients with atopic keratoconjunctivitis. *Eye (Lond).* 2007;21(7):968–975. doi:10.1038/sj.eye.6702367.
20. Goh CL, Ng SK, Kwok SF. Allergic contact dermatitis from nickel in eyeshadow. *Contact Dermatitis.* 1989;20:380–381.
21. Hjorth N, Schmidt H, Thomsen K. Fusidic acid plus betamethasone in infected or potentially infected eczema. *Pharmatherapeutica.* 1985;4:126–131.
22. Ramsay CA, Savoie JM, Gilbert M, Gidon M, Kidson P. The treatment of atopic dermatitis with topical fusidic acid and hydrocortisone acetate. *Journal of the European Academy of Dermatology and Venereology.* 1996;7:S15–S22. doi:10.1016/0926-9959(96)00032-3.
23. Alvarez MS, Brancaccio RR. Periorbital dermatitis. *Dermatitis.* 2006;17:43–44.