Unbearable wearables

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Abstract

As wearable devices play an increasing role in the management of health and disease, adverse skin reactions to wearables have become more common. However, the management of allergic contact dermatitis is challenging and new treatment options more compatible with wearable devices are needed. In a 40-year-old woman with contact dermatitis to a continuous glucose monitoring device, topical clobetasol propionate 0.05% spray proved to be an effective treatment that was compatible with the application of adhesive wearables. This case demonstrates that spray formulations of topical steroids are a good option for the treatment of dermatitis under wearable devices such as continuous glucose monitors or ostomy appliance.

Keywords: allergic contact dermatitis, clobetasol propionate 0.05% spray, topical steroids, steroid spray, wearables, devices

Introduction

Wearable devices are playing an increasing role in the management of health and disease. Consequently, adverse skin reactions to wearables are more common. For example, one study reported that 8 out of 10 pediatric diabetic patients wearing continuous glucose monitoring (CGM) devices experienced skin issues related to the device and another study cited cutaneous complications as the cause for 18% of patients who discontinued their use of CGM devices [1, 2]. Herein, we present a case of contact dermatitis to a CGM device and discuss the advantages of spray-on topical steroids in patients dealing with wearables.

Case Synopsis

A 40-year-old woman on insulin replacement therapy for diabetes presented to the dermatology clinic with a three-month history of a pruritic rash on her upper arms in the setting of wearing a new Flash Glucose Monitoring device, the FreeStyle® Libre (Abbott, Chicago, Il, US). The rash began on the right arm after two months of using the device, which is attached via a dermal adhesive and changed weekly. The eruption initially responded to triamcinolone 0.5% cream. However, when the patient switched the device from the right arm to the left, a more severe reaction developed in the new area of device application. This failed to respond to 0.5% triamcinolone cream and a barrier solution recommended by the device manufacturer also failed to relieve the symptoms.

On physical exam, a well-demarcated, round, erythematous, papulovesicular plaque was present on the left upper arm; the right arm exhibited a hyperpigmented patch (**Figure 1**). She was diagnosed with allergic contact dermatitis (ACD) to either the Freestyle® Libre wearable or adhesive on the device and prescribed clobetasol propionate 0.05% spray for use prior to device attachment. The patient's symptoms improved after two months of weekly application and hydrocortisone 1% spray was prescribed for maintenance. She remains symptom-

free at the time of this report, five months after her initial presentation.

Case Discussion

This patient's clinical history and examination findings are highly suggestive of ACD, a type IV delayed hypersensitivity reaction to an external allergen. Indeed, numerous cases of ACD caused by the FreeStyle® Libre CGM system have been reported and isobornyl acrylate, a component of the FreeStyle® Libre sensor, was identified to be the culprit allergen in 12 reported cases [3].

Although patch testing is the gold standard in the evaluation of ACD and avoidance of the offending agent is the definitive treatment, not all allergens can be avoided. Additionally, commercially available patch testing is only 70-80% sensitive, as these tests include only a limited selection of common allergens [4]. In the cases of medically-necessary adhesive devices, treatment through the skin symptoms may be preferred to stopping the offending agent; successful empiric initial management may offer relief to patients and help avoid unnecessary testing. In our case, the patient opted for a trial of empiric topical therapy prior to considering discontinuation of the device.

Off-label use of nasal corticosteroid sprays has been recommended in the diabetes literature for cutaneous complications associated with diabetes devices, revealing a clinical unmet need for a topical corticosteroid formulations that are compatible with wearable devices [5]. Herein, we report the successful management of ACD to an adhesive CGM device with topical clobetasol 0.05% spray, a formulation of 0.05% clobetasol propionate in an alcohol-based vehicle. Once applied, it evaporates quickly and leaves almost no residue, thus making it an attractive option for use under occlusion [6]. These properties also make it an appealing and effective option for other similar uses, such as ostomy appliance-associated peristomal dermatitis. Taken together, topical corticosteroid sprays are a powerful addition to the arsenal of dermatologists, especially those managing patients who are struggling with unbearable wearables.

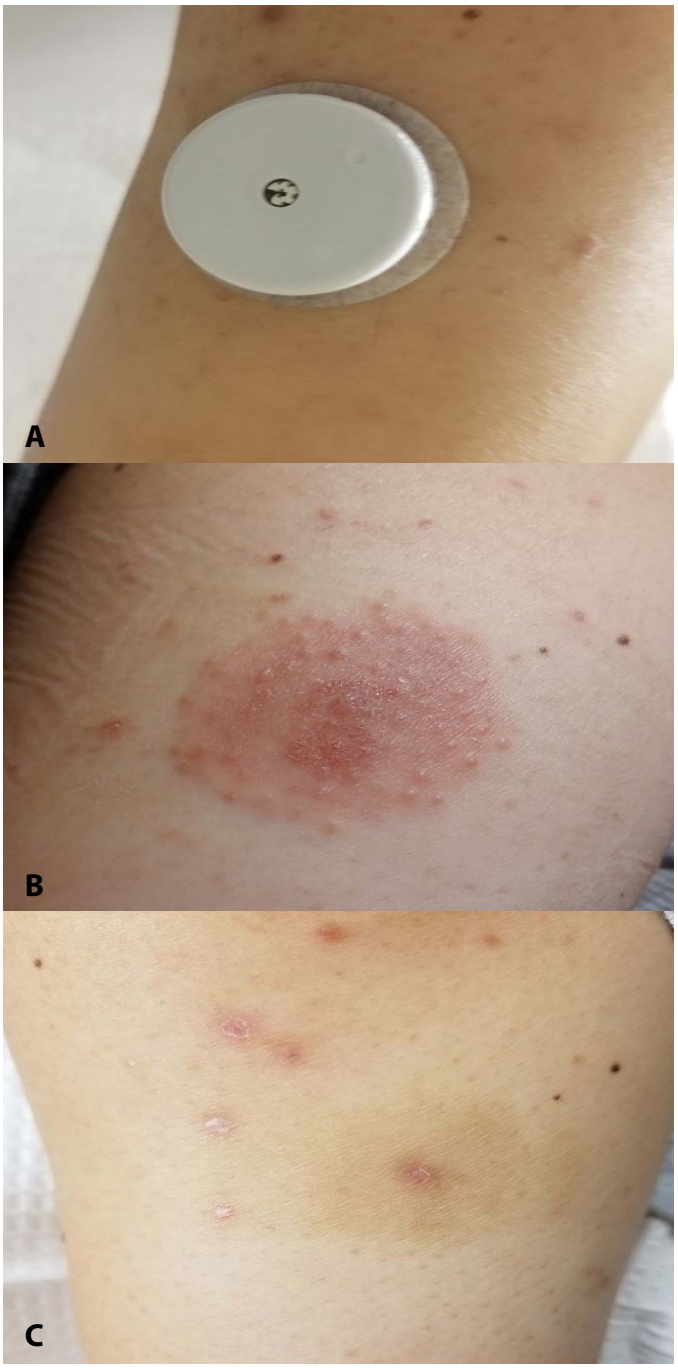

Figure 1. ***A)*** *Left arm. FreeStyle® Libre attached to the left upper arm.* ***B)*** *Left arm. Round, erythematous, papulovesicular plaque surrounded by scattered erythematous papules on the left upper arm.* ***C)*** *Right arm. Round, hyperpigmented patch surrounded by excoriated, hyperpigmented papules on the right upper arm.*

Conclusion

Spray formulations of topical steroids are a good option for the treatment of dermatitis under wearable devices such as continuous glucose monitors or ostomy appliance.

Potential conflicts of interest

Misha Rosenbach MD reports the following financial interests: Merck-Advisory Board, Honoraria; Processa Pharmaceuticals-Consultant, Honoraria, Research Expert, Grants to institution; JAMA Dermatology, Deputy Editor- Salary. Jenny Wei, BS, Elizabeth Hayward, CRNP, and Thomas Leung MD/PhD report no financial or personal affiliations or relations with individuals or organizations that could potentially influence the Authors' work/manuscript.

References

1. Feig DS, Donovan LE, Corcoy R, et al. Continuous glucose monitoring in pregnant women with type 1 diabetes (CONCEPTT): a multicentre international randomised controlled trial. *Lancet*. 2017;390:2347-2359. [PMID: 28923465].
2. Thyssen JP, Simonsen AB, Zachariae C, et al. High frequencies of dermatological complications in children using insulin pumps or sensors. *Pediatr Diabetes*. 2018;19:733-740. [PMID: 29484783].
3. Herman A, Aerts O, Baeck M, et al. Allergic contact dermatitis caused by isobornyl acrylate in Freestyle ® Libre, a newly introduced glucose sensor. *Contact Dermatitis.* 2017;77:367-373. [PMID: 28804907].
4. Rashid RS, Shim TN. Contact dermatitis. *BMJ*. 2016;353. [PMID: 27364956].
5. Messer LH, Berget C, Beatson C, Polsky S, Forlenza GP. Preserving Skin Integrity with Chronic Device Use in Diabetes. *Diabetes Technol Ther*. 2018;20. [PMID: 29916740].
6. Bhutani T, Koo J, Maibach HI. Efficacy of clobetasol spray: Factors beyond patient compliance. *J Dermatolog Treat*. 2012;23:11-15. [PMID: 21254848].