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Case report

Allergic contact dermatitis due to nickel in household detergent

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Abstract

Allergic contact dermatitis (ACD) is a cutaneous inflammatory reaction caused by contact with specific exogenous allergen to which a person has developed allergic sensitization. Nickel was reported as one of the most common causes of ACD worldwide, particularly affecting females. It is associated with a variety of nickel-containing products, from jewelry to detergent.

A 32-year-old female was presented with pruritic eruption consist of erythematous papules and vesicles on both hands and extensor forearms since 2 weeks before admission. The patient is a housewife who did handwashing clothes and kitchenware with detergent and soap every day. At first, there were erythematous papules on the right extensor forearm, then the patient wore rubber gloves to protect hands when washing. However,the lesions spread to the left extensor forearm and there were also vesicles on both hands. There was history of localized reactions to metal items, the latter one was 3 weeks ago after wearing a metal necklace.The clinical presentation were multiple erythematous papules and vesicles, erythematous and hyperpigmented macules. The patch test using Chemotechnique Diagnostics AB and IQ chamber showed a 2+ reaction to nickel sulfate. The patient was educated to avoid the causative allergen and treated with oral antihistamine and topical corticosteroid. The patient showed significant clinical improvement after 2 weeks.

Nickel as metal catalyst used in detergents is found in small concentration, but can lead to ACD in an already sensitized individual.The lesions persist despite the use of gloves because nickel is absorbed through rubber material.

Keywords*: allergic contact dermatitis, nickel, metal catalyst, household detergent, patch test*

Background

Allergic contact dermatitis (ACD) is a delayed type hypersensitivity reaction caused by skin contact with an environmental allergen.[1] Approximately 15–20% of adults in the general population suffers from contact allergy. Workplace exposure, age, sex, use of consumer products and genetic predispositions were identified as the most important risk factors.[2]

Currently, nickel allergy is the most common cause of contact dermatitis in the industrial world, particularly affecting females. Nickel is a ubiquitous metal used in a wide range of products including those that have a prolonged contact with the skin. Furthermore, the presence of nickel in household detergents and soaps is a rising subject of discussion.[3,4]

Classically, ACD due to nickel presents as a pruritic eczematous dermatitis on the neckline, the earlobes or the wristband since those are common areas for exposure to nickel-containing jewelry. The lesions will vary morphologically depending on the stage of the disease.[1]

Basically, diagnosing ACD is mainly established by a comprehensive clinical history and physical

examination, as well as by performing diagnostic patch testing.[5] Allergen identification can be achieved through proper patch testing, therefore removal of the causative agents should always be the main goal in ACD treatment.[6]

Case Illustration

A 32-year-old female was presented with pruritic eruption consist of erythematous papules and vesicles on both hands and forearms since 2 weeks before admission. At first, there were pruritic erythematous papules on the right forearm. The lesions spread to the left extensor forearm and there were also vesicles on both hands. The patient is a housewife who did handwashing clothes and kitchenware with detergent A and soap every day. The patient wore gloves to protect hands when she was washing, but the lesions continue to develop. The patient was not using any skin care products. The patient did not take any medication to treat the disease. There was history of localized reactions to metal items, the latter one was 3 weeks ago after wearing a metal necklace. The physical examination revealed multiple erythematous papules, some with red-blackish crusts, scattered on both extensor forearms, multiple erythematous macules to plaques, discrete and confluent vesicles on both hands, as well hyper pigmented macules and erythematous papules on the neck (Figure 1). The patch test using Chemotechnique Diagnostic AB and IQ chamber showed a 2+ reaction to nickel sulfate at 48 and 72 hour readings (Figure 2). The patient was diagnosed with allergic contact dermatitis due to nickel. The patient was educated to avoid the causative allergen and treated with oral antihistamine and topical corticosteroid. The patient showed significant clinical improvement after 2 weeks (Figure 3).

Discussion

ACD is a T cell-mediated, delayed-type hypersensitive immune response induced by contact allergens. As the name implies, ACD will occur only after a person has become sensitized to an allergen. Although innate immunity plays a role in ACD, it is primarily mediated by an adaptive T cell-mediated immune response and, hence, can be divided into a sensitization phase and an elicitation phase. The sensitization phase includes the events following a first contact with the allergen and is complete when the individual is sensitized and capable of giving a positive ACD reaction. By renewed allergen contact, the elicitation phase is initiated and pro-inflammatory cytokines and chemokine are produced. This leads to a gradually developing eczematous reaction as clinical manifestation of ACD. The entire process of the sensitization phase requires at least 4 days to several weeks, whereas the elicitation phase reaction is fully developed within 1–4 days.[7,8] In this case, the patient is thought to have developed allergic sensitization to nickel since the eczematous eruption usually appears after 1 or 2 days after wearing any metal jewelry.
The diagnosis of allergic contact dermatitis due to nickel in this patient was made based on history taking, physical examination and patch testing. There was history of previous localized dermatitis to metal items in this patient, the latter one was 3 weeks ago after wearing a metal necklace. The physical examination revealed erythematous papules and scaly macules with vesicles on both hands and multiple erythematous macules and papules on the neck which are the typical appearance of eczematous dermatitis compatible with ACD. Careful consideration should be given to occupation-specific exposures in the evaluation of patients with hand dermatitis.[9] The patient is a housewife who does handwashing clothes and kitchenware with detergent A and soap every day. Besides its ever-expanding application in metallurgy, nickel compounds are important in the production of many catalysts used in the manufacture of surfactants, the most important ingredient present in every detergent and soap formulation.[10] The rubber gloves used by the patient did not provide protection because based on an investigation, nickel may penetrate rubber material.[11]

The differential diagnoses in this case were irritant contact dermatitis (ICD) and pompholyx. Physical findings in ICD can be indistinguishable clinically with ACD, in general there is an absence of vesiculation and burning exceeds itching. The important distinction is no sensitization reaction takes place in ICD, and the intensity of the irritant inflammatory reaction is proportional to the dose of the irritant.[1] Pompholyx is defined as a clinical variant of eczematous lesions, involving exclusively palmar skin and/or lateral aspect of the fingers. Clinical symptoms of pompholyx are characterized by the occurrence of numerous vesicles or bullae, either isolated or grouped that appear on normal skin or underlying erythema of the palms, associated with intense pruritus. It has

been argued that, in some case, pompholyx reflects an id reaction to ACD. A particular relationship between pompholyx and nickel ingestion in nickel-sensitive patients has been advocated, but it remains controversial.

Patch testing is a well-established method of diagnosing ACD. Patients with a history and clinical picture of contact dermatitis are re-exposed to the suspected allergens under controlled conditions to verify the diagnosis.[7,8] The standard patch test technique involves application of the test allergen strips onto the upper back skin under occlusion for 2 days. Conventionally, patch test reading is performed at day 2, 15-30 minutes after the removal of patch test stripes. Reading is further performed at day 3, 4 and 7. Positive reactions at day 2 should not be considered positive unless the reactions persist into day 3 and beyond.[7]

In ACD, the basis for therapy is the recognition of the causative allergen. Once the causative allergen has been identified, the key to the therapeutic success lies in its avoidance. In this case, patient was educated to avoid nickel-containing detergents and soaps, if possible. The patient also should avoid nickel-containing items and foods, such as cereals, nuts, chocolates and fish. The patient was recommended to wear gloves when working with cleaning products. The choice of glove material for protection in occupations that require handling of nickel must be selective since it was demonstrated that nickel is absorbed through rubber gloves while no such absorption occurred through polyvinyl chloride (PVC) material. Besides, vinyl gloves adequately protect the hands from detergents and soaps without causing rubber dermatitis. The pharmacologic therapy aimed to reduce the inflammation should be based on the stage, severity and morphology of lesions.[1,8,11]

Conclusion

One case has been reported in a 32-year-old female with ACD due to nickel. It may be due to the chronic contact with nickel-containing detergent or soap. The patch test showed a 2+ reaction to nickel sulphate at 48 and 72 hour readings. The patient is educated to avoid nickel-containing detergents/soap if possible, and wear PVC gloves when washing. The patient treated with oral antihistamine and topical corticosteroid and showed significant clinical improvement after 2 weeks.

Figures

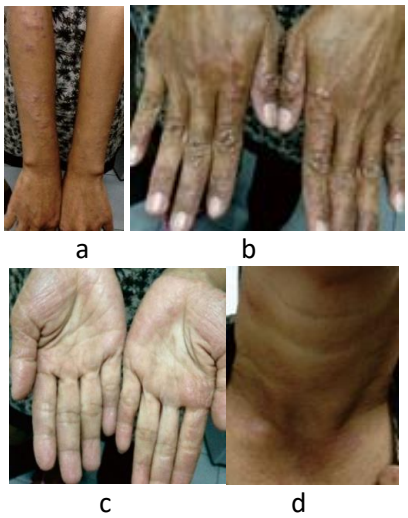

Figure 1. Multiple erythematous papules, some with red-blackish crusts, scattered on both (a) extensor forearms, (b, c) multiple erythematous macules to plaques, discrete and confluent vesicles on both hands, (d) multiple hyperpigmented macules and erythematous papules on the neck.

Figure 2. Patch test showed a strong (2+) reaction to nickel sulfate. The erythemato-vesicular reaction at 48 hours (day 2) became larger at 72 hours (day 3).

Figure 3. The patient showed significant clinical improvement after 2 weeks. Minimal erythematous macules on both hands and extensor forearms. Erythematous papules and vesicles were no longer found.

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