CHAPTER 34

Non-Eczematous Occupational Contact Reactions

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Introduction

Contact reactions may present as non-eczematous lesions. A variety of non-eczematous occupational contact reactions has been described. The exact pathomechanism of these reactions is unknown. The following non-eczematous contact reactions have been described:

1. Erythema multiforme-like eruption [urticarial papules and plaque eruptions (UPPE)]
2. Purpuric eruption
3. Lichen planus-like eruption
4. Papular and nodular eruption
5. Granulomatous reaction
6. Pustular eruption
7. Erythema and exfoliation
8. Pseudoscleroderma

Erythema Multiforme-like Reaction (UPPEs)

Several contact allergens, e.g., metal, topical medications, wood and industrial chemicals have been reported to cause “erythema multiforme-like” eruptions. These allergic contact reactions can be confirmed by positive patch-test reactions. The morphology of these reactions includes target-like erythematous, and urticarial lesions. Such eruptions have been described as UPPE to distinguish them from the erythema-multiforme (Goh 1989).

Clinical Features

The characteristic presentation is usually an eczematous lesion on the primary contact site. Within a few days, urticarial papular and plaque lesions appear on the primary contact site, spreading to adjacent skin and occasionally distant sites. The urticarial eruptions persist longer than the primary eczematous lesions and tend to persist after the disappearance of the initial dermatitis.

Patch Test

In all cases, a positive patch test to the contact allergen can be elicited. The patch-test reaction is always eczematous and often severe.

Histology

The epidermis is normal or shows mild spongiosis with upper dermal edema and perivascular lymphohistiocytic infiltrate. Vacuolar degeneration of the basal cells is occasionally present. The classical features of erythema-multiforme are absent. The morphology, clinical course and histology of the eruptions are not characteristic of classical erythema multiforme.

The pathomechanism of these papular and urticarial eruptions is unknown. An immune complex reaction may be the basis of the clinical manifestation here. Goh postulated that the allergen is absorbed percutaneously and evoked an allergic contact dermatitis at the primary site, while concurrently forming immune complexes with a circulating antibody (Goh 1989). The immune complexes were probably deposited in the microvasculature and triggered by an inflammatory process that led to the UPPE. Occupational allergens reported to cause UPPE include woods and/or plants, and chemicals.

Woods and Plants

Holst et al. (1976) described three carpenters who developed erythema multiforme-like eruption from contact allergy to three different tropical woods – Rio rosewood (Dalbergia nigra), pao ferro (Mackerium scleroxylon) and Eucalyptus saligna. The antigen in pao ferro was R-3, 4-dimethoxy-dalbergione. A wooden bracelet (Fisher 1986) and pendant (Fisher and Bikowski 1981) made from Dalbergia nigra were also reported to cause erythema multiforme-like eruption. The specific chemical antigen was identified as quinone R-4-methoxy-dalbergione (Hausen 1981). Nonoccupational causes have also been reported. Irvine et al. (1988) reported such reaction to pao ferro.
(Machaerium scleroxylon) in a hobbyist handling the wood. Plants reported to cause erythema multiforme-like eruption include poison ivy (Toxicodendron) (Schwartz and Downham 1981; Mallory et al. 1982), primula (Primula obconica) (Hjorth 1966) and mugwort (Artemesia vulgaris) (Kurz and Rapaport 1979). Mallory et al. (1982) reported urticarial eruptions with black deposits on the skin of four patients with Toxicodendron radicans dermatitis. Urticaria, erythema multiforme-like eruptions, in a patient from Rhus dermatitis was reported by Schwartz and Downham (1981). They recommended that patients with such reactions should be screened for systemic involvement as previous reports have shown that nephritis can be an associated feature (Meneghini and Angelini 1981; Fisher 1986).

Metals and Chemicals

Metals and several industrial chemicals have been reported to cause UPPE in sensitized patients. Nonoccupational UPPE from nickel was first described by Calnan (1956). Cook also reported UPPE in a 13-year-old girl due to allergic contact dermatitis from nickel and cobalt from the metal studs in her jeans (Cook 1982). Friedman and Perry (1985) described a garment worker who developed UPPE from nickel dermatitis on her hands from her scissors. Patch test revealed allergy to nickel and paraphenylenediamine. During patch testing, there was exacerbation of the worker’s hand dermatitis and UPPE. Similar eruption appeared when the worker was patch tested to nickel alone.

Laboratory Chemicals

De Feo reported chemistry students who developed UPPE while synthesizing 9-bromofluorene in the laboratory (De Feo 1966). Roed-Petersen reported of a 22-year-old chemistry student who developed UPPE on the exposed parts from a phenyl sulfone derivative which he was synthesizing. Patch test revealed allergy to nickel and paraphenylenediamine. During patch testing, there was exacerbation of the worker’s hand dermatitis and UPPE. Similar eruption appeared when the worker was patch tested to nickel alone.

Industrial Chemicals

Nethercott et al. (1982) reported of four men working with printed circuit boards who developed erythema multiforme. Liver involvement was documented in three cases. Formaldehyde was suspected to be the cause of the eruption since two of the workers gave a positive reaction to formaldehyde. However, these workers were also exposed to other substances, including trichloroethylene. Trichloroethylene was suspected to cause erythema multiforme in five workers in an electronic factory. The liver was involved in three workers and one died of liver failure. Patch test to trichloroethylene on one worker was negative. The reaction was suspected to be due to a hypersensitivity reaction from percutaneous and/or transrespiratory tract absorption of trichloroethylene (Phoon et al. 1984).

Goh (1988) reported erythema multiforme-like eruption in a worker with contact allergy to trinitrotoluene who was employed at an ammunition factory. The systemic absorption of trinitrotoluene appeared low as its urinary metabolite, dinitroaminotoluene, was not detected. Patch test to trinitrotoluene gave a strong eczematous reaction.

Recently, contact dermatitis to natural rubber latex was also reported to present with features of erythema multiforme-like eruptions (Bourrain et al. 1996). Airborne erythema multiforme-like eruption was also reported in individuals exposed to pyrethrum (Garcia-Bravo et al. 1995).

Pigmented Purpuric Reaction

Occupational contact allergy occasionally presents as purpuric eruption. The eruption may or may not be preceded by erythema or itch. The exact mechanism of the reaction is unknown. It appears to represent an immune complex disease. Percutaneous absorption of contact allergens appears to form immune complexes with a circulating antibody that becomes deposited in the microvasculature, producing the vasculitic lesions. However, such immune complexes cannot be identified (Calnan and Peachey 1971). Purpuric eruption associated with allergic contact dermatitis to rubber chemical N-phenyl-n-isopropyl-PPD (IPPD) in clothing was described by Batscharov and Minkov in 1968. Allergic contact dermatitis to IPPD, which is used in the manufacture of some types of rubber in rubber boots, was also reported to cause purpuric eruption (Calnan and Peachey 1971). Fisher (1974) reported similar eruptions in three patients caused by a rubber diving suit, elasticized shorts and a rubberized support bandage. Romaguera and Grimalt (1977) also reported similar eruption from IPPD in a rubberized brassiere due to nonoccupational cause. Shmunes (1978) reported of a woman with purpuric allergic contact dermatitis to paraphenylenediamine from black hats she was handling as a saleswoman.

Lichen Planus-Like and Lichenoid Reaction

Occupational allergic contact dermatitis to some color developers may manifest as lichen planus-like eruptions. Such eruptions often present as itchy, dusky or