

Purpuric contact dermatitis from footwear

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Several chemicals coupled with friction and a hot, humid environment within footwear creates an ideal situation for development of allergic contact dermatitis. In spite of this, contact dermatitis from footwear is relatively rare. Its reported prevalence is 3–6% in England and 11.7% in India (1). People of all ages can develop footwear allergy (2). Constituents of rubber, adhesive, and leather in footwear are its most common causes. The pattern of contact dermatitis conforms to the location of the offending agents in the shoe. Purpuric contact dermatitis from black rubber boots, gloves, clothes (caused by textile finishes, fibreglass, optical

whiteners, and pressure), and tyres has been reported but is a rare form of non-eczematous contact dermatitis (2–5). We report here a case of purpuric footwear contact dermatitis, a not so common entity.

Case Report

A 29-year-old male horticulturist presented with diffuse pruritic eruption over dorsa of both feet of 20 days duration. History showed that he had started wearing a new pair of rubber shoes a week prior to onset of the rash. The lesions were intensely itchy and mildly painful, especially when sweating occurred. Cutaneous examination showed symmetrical, purpuric, edematous plaques of dermatitis over the dorsa of both feet and soles involving the areas in direct contact with shoes' surface but sparing insteps and web spaces (Fig. 1). Systemic and laboratory workup showed no abnormality. A diagnosis of purpuric allergic contact dermatitis was made in view of its characteristic clinical pattern and onset after a week's contact with rubber shoes. His dermatitis subsided with 1 week of oral prednisolone 30 mg/day and topical betamethasone dipropionate cream. He was also advised not to wear rubber shoes. Patch testing after 2 weeks with offending shoe material and Indian patch test series (6) produced strong positive (2+) and purpuric reactions with black rubber mix and shoe material. Patch test to paraphenylenediamine (PPD) was negative. His footwear



Fig. 1. Purpuric contact dermatitis involving both feet.

dermatitis did not recur after he stopped wearing his rubber shoes.

Discussion

Knowing the composition of shoes is imperative to evaluate a patient of footwear allergy. Leather, rubber, glues, dyes, or rarely the linings used in shoes are potential contact sensitizers. Dorsal foot allergy points to allergens in the shoe upper made from leather or synthetic materials like polyurethane or neoprene foam. The usual chrome tanning of leather exposes the wearer to chromate allergy. After tanning, the process of oiling, dyeing, and finishing to get an attractive and tough outer coat involves chemicals with a potential for contact dermatitis. The common rubber allergens are phenolic resins, thioureas, carbamates, and chemical additives (antioxidants and accelerators for vulcanization) (7). Fibreboard and counters containing adhesives and biocides are used to maintain or give shape to the shoe (8). Nickel in shoe trim and eyelets may also cause dorsal foot allergy (9). The adhesives, a major cause of footwear allergy, are hot melts, urethane, neoprene, and natural rubber (latex) (10). Various substances like *p*-tert-butylphenol-formaldehyde resin, colophony, and epoxy resins impart allergenicity to these adhesives (10). Allergic contact dermatitis may also occur from polyurethane and polyvinylchloride compounds or their constituents, as they are being used extensively in footwear making (11, 9). However, variations in individual allergen sensitivity occur because of varying chemical composition of footwear or individual susceptibility.

Black rubber mix constitutes the following antioxidants: N-isopropyl-N-phenylparaphenylenediamine (IPPD), N-cyclohexyl-N-phenylparaphenylenediamine (CPPD), and N,N-diphenyl-p-phenylenediamine (DPPD). IPPD is added to elastic material used in rubber shoes and may cause contact sensitivity with varying clinical manifestations. Fousereau et al. (12) reported a case of allergic contact dermatitis caused by IPPD from a wrist strap, while Ancona et al. (5) reported lichenoid contact allergic dermatitis to IPPD in tyre assemblers. Fisher (13) and Romaguera et al. (2) separately described eczematous contact dermatitis and a syndrome of pruritus, petechiae, purpura, and

sensitization to IPPD (PPPP syndrome) caused by IPPD and thioureas in boots. Our patient appears similar to a case described by Roed-Peterson et al. (3) who had purpuric contact dermatitis of wrists and dorsa of hands caused by sensitization from black rubber mix in rubber tyres. Their patient showed purpuric and strong (2+) patch test reaction with black rubber mix as well as with IPPD, CPPD, and DPPD when patch tested separately. Though our patient showed strongly positive patch test reaction to black rubber mix, we could not check contact sensitivity for the 3 components separately. PPD, a hair and fur dye, too can produce purpuric contact dermatitis (14). Negative patch test reaction to PPD in our patient, however, suggests that it does not cross-react with ingredients of black rubber mix.

Purpuric allergic contact dermatitis is a rare and poorly understood condition. It has been principally described for rubber chemicals (15) or textile dyes (16) and rarely because of chromium (17), epoxy resins (18), and formaldehyde resins (19). Irritant purpuric contact dermatitis too has been observed with topical EMLA cream (20), benzoyl peroxide (21), and sap of weed *Agave americana* (22). This type of reaction has been attributed to direct toxic effect on blood vessels as leucocytoclastic vasculitis that clinically manifests as purpuric vasculitis-like eruptions (20–22). As the exact nature of purpuric contact dermatitis, whether irritant or allergic, remains unelucidated, we tend to agree with the suggestion of Roed-Peterson et al. (3) that it must be accepted as a manifestation of contact dermatitis and should be evaluated accordingly.

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