

CASE REPORT

Allergic contact dermatitis due to a PVC table cover

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Background Plastics are a common cause of occupational skin disorders such as irritant or allergic contact dermatitis (ACD).

Case report We report a case of occupational ACD due to a polyvinyl chloride (PVC) plastic table cover used as a mouse pad for which we performed patch tests and obtained positive patch tests for the PVC table cover. Composition testing revealed the presence of phthalates and phosphites, which may represent the specific allergens.

Conclusions Contact with some of the chemical components of the PVC table cover, together with a combination of sweating and friction, may have enhanced the allergenicity of these components. Workplace adjustment resulted in disappearance of the dermatitis.

Key words Allergic contact dermatitis; mouse pad; plastic; polyvinyl chloride.

Introduction

Plastics are a common cause of occupational skin disorders through irritation or allergic contact dermatitis (ACD). These generally occur during the plastic fabrication process and are rarely due to the end product itself. We report a case of ACD due to a polyvinyl chloride (PVC) plastic table cover used as a mouse pad.

Case report

A 35-year-old woman was referred by her occupational physician, due to contact dermatitis affecting the right thenar and hypothenar eminences. She had worked for 10 years in a plumbing equipment factory as a stock controller. She intermittently used a computer to control and change stock and did so for ~2 h/day.

Two years ago, her workplace had been equipped with a new computer and the introduction of this computer meant that the patient's dominant hand had prolonged contact with the counter. The surface of the desk was covered with a plastic material normally used to waterproof roofs and was used as a mouse pad.

A few weeks after the introduction of the new computer, the patient developed an itchy and scaly dermatitis on the wrist surface in contact with the plastic table cover

(Figure 1). The skin lesions were located at the right thenar and hypothenar eminences only. These were cracked, did not seep and were itchy and scaly on an erythematous base, with several scars of old vesicles (Figure 2). The skin disorder improved during holidays and recurred when the subject returned to work. The patient had no history of atopy and had not been exposed to other substances in the factory or during normal daily life.

Patch tests were performed. The standard European series, the rubber and the plastic–glue–resin series, the patient's body cream and new and used table cover were tested. The reactions were scored according to the International Contact Dermatitis Research Group guidelines (Table 1) and read visually on Day 3 at 72 h.

The sites tested using the table cover, both new and used, showed a weak positive reaction (one '+') (Table 2). There were also weak positive reactions for some of the rubber series known to be allergenic (Table 2). All other readings were doubtful or negative.

The safety data sheet for the table cover revealed only the presence of PVC.

The patient was diagnosed with ACD due to the table cover and a plate glass was placed on the counter to avoid all contact of the patient's skin (and other employees' skin) with the PVC. The patient's ACD resolved following this workplace adjustment and a few weeks later the patient was asymptomatic.

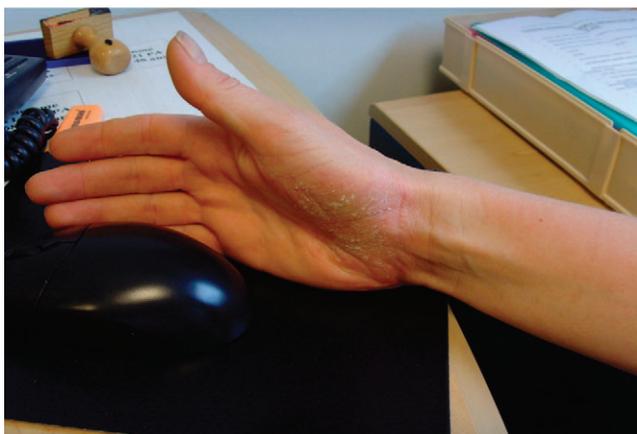


Figure 1. Lesions were located at the right thenar and hypothenar eminence.



Figure 2. Lesions were cracked and scaly on an erythematous base, with scars of old vesicles.

Discussion

In this case, the causative chemical agent could not be specifically identified. Nevertheless, the diagnosis of ACD is valid considering the chronology of the symptoms, with an improvement during holidays, the topography of the lesions, the absence of other lesions, the presence of old vesicles and improvement after workplace adjustment. Positive patch tests were found that exactly matched the product the patient had been exposed to (used for a few months) and to a new sample that had not been used. Indeed, both tests support that the patient was allergic to the table cover and not to another component that they could have come into contact with during work.

The safety data sheet obtained from the manufacturer mentioned the presence of PVC in the table cover. Products

Table 1. Patch test results according to the International Contact Dermatitis Research Group guidelines

Score	Patch test reaction	Clinical criteria
–	Negative	No reaction
+/-	Doubtful	Faint erythema only
+	Weak positive	Erythema, infiltration, possibly papules
++	Strong positive	Erythema, infiltration, papules, vesicles
+++	Extreme positive	Intense erythema and infiltration and coalescing vesicles

Table 2. Positive patch test results for the patient

Rubber series		
<i>N</i> -cyclohexyl-2-benzothiazyl sulphenamide		+
Tetra-methyl thiuram monosulphide		+
Diphenyl thiourea		+
Hydroquinone monobenzyl ether		+
Diphenyl-4-phenylene diamine		+/-
4-Amino-azobenzene (solvent yellow1)		+/-
Benzoyl peroxide		+/-
Dibutyl thiourea		+/-
Morphol mercaptobenzothiazol		+/-
Dipentamethylthiuram tetrasulphide		+/-
Table cover		
New		+
Used		+
Plastic-glue-resin series		
2-(Hydroxyethyl)methacrylate		+/-
Triethylene glycol dimethacrylate		+/-
BIS GMA		+/-
European standard series		
Tixocortol-21-pivalate		+/-
Aluminium		+/-

composed of PVC generally contain other additives such as plasticizers, antioxidants, pigments and stabilizers. Numerous cases of ACD related to PVC have been reported. Most have identified causative chemical agents such as di-*(n*-octyl)tin-bis(2-ethylhexylmaleate) [1], benzisothiazolinone [2] or bisphenol A [3]. There are some cases of ACD to PVC where the causative chemical agent is not identified as the authors could not carry out further tests (either the patient refused new tests or there was not enough safe skin for testing) [4,5].

A few months after the first examination, we obtained the exact composition of the PVC table cover. It contained PVC, diisononylphthalate, isodecyl diphenyl phosphite, trinonyl phenyl phosphite, didecyl phenyl phosphite, alcohols and multiple other components

including antioxidants, pigments, antimontrioxyde, barium oleate and carbonate, zinc dibenzoate, polyethylene, acrylic copolymer and phenol. These components were not included in the patch tests. We did not carry out further tests because the patient was not available.

There are only a few reported cases of ACD from phthalates and phosphites, which may be the responsible agents in our case. A review of the literature revealed seven cases implicating phthalates, including ACD due to a cream to treat ringworm [6] and to a PC mouse [7]. There are only three reported cases of ACD due to phosphite.

Occupational contact dermatitis occurs due to exposures to chemicals present in the patient's workplace. Many factors can influence the response to an allergen and cause ACD. Sweating or friction can be factors that provoke ACD to a chemical agent; however, we cannot recreate these conditions with patch testing. This mechanism was initially suggested by Seishima *et al.* [8] in a case of ACD caused by hexavalent chromium on a cellular phone. Seishima *et al.* suggested that the chromium metal alone is not a hapten but could be transformed into one, in order to cause ACD, by reacting with sweat, saliva or plasma. Also, interaction between many components of the finished plastic product might be implicated in the onset of allergy.

In conclusion, we did not definitively identify the causative chemical agent of the ACD developed by our patient. Nevertheless, the history of dermatitis and the patch tests positive for the PVC table cover allowed us to make a diagnosis of occupational ACD and to implement workplace adjustments resulting in resolution of the patient's symptoms, without medicinal treatment. Testing every component individually was not performed as it may be misleading. This is because the particular conditions present in the workplace cannot be reproduced during patch testing. Sweating, friction or the interaction between numerous components could influence the allergenicity of chemical agents.

Key points

- The diagnosis of allergic contact dermatitis is made by the chronology, symptomatology and topography of skin lesions. Positive patch tests help confirm the diagnosis.
- A combination of numerous components, such as sweat, saliva or friction, could influence the allergenicity of some chemical agents.
- Patch testing each potential allergen individually may be misleading and could lead to false negatives.

Conflicts of interest

None declared.

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