

Occupational cobalt-allergic contact dermatitis resulting from polyester resin

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Introduction

Cobalt is well recognized as a contact sensitizer in hard-metal manufacturing,

but may also be present in other occupations, such as those involving unsaturated polyester resins. We report a case in a boat-builder of occupational allergic contact dermatitis caused by cobalt 2-ethylhexanoate, present as an accelerator in unsaturated polyester resin.

Case Report

A 41-year-old non-atopic man was first seen in the dermatology outpatient clinic at Odense University Hospital in 2008 with suspected occupational hand dermatitis. The clinical picture was not typical of contact dermatitis, with discrete excoriated papules and some lichenified plaques on the dorsum of the hands and wrists (Fig. 1). The palms were unaffected. Punch biopsies taken from the dorsum of the hands showed changes consistent with lichen simplex.

Diagnostic patch testing was performed with the department's baseline series supplemented with the patient's own gloves. The baseline series comprised TRUE[®] test panels supplemented with pet.-based test preparations from Trolab[®] (Almirall Hermal GmbH, Reinbek, Germany) and Chemotechnique[®] AB (Chemotechnique Diagnostics, Vellinge, Sweden) to complete the European baseline series. Finn Chambers[®] on Scanpor[®] tape (Allerderm, Phoenix, AZ, USA) were used for application of the

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Fig. 1. Lichenified plaques and excoriated papules on the dorsa of the hands.

Table 1. Positive patch test results 2009

Component	% vehicle	D3	D7
Nickel sulfate	200 µg/cm ²	—	+
Cobalt chloride	20 µg/cm ²	+	+
Cobalt naphthenate*	2% pet.	++	++
Cobalt naphthenate	2% aqueous	++	+
Cobalt 2-ethylhexanoate†	1.3% pet.	++	++

*Cobalt naphthenate, Sigma-Aldrich, product number 544574.

†Cobalt 2-ethylhexanoate, Sigma-Aldrich, product number 444545.

pet.-based substances. There was only one positive reaction on D3 (+) and on D7 (+?) to cobalt chloride 20 µg/cm² (TRUE test). At that time, it was not considered to be of clinical relevance.

The pruritic component of the rash improved on weekends away from work, and the rash would completely clear during longer holidays. The patient tried multiple topical treatments, with no significant improvement, apart from when he was away from work. He had worked for 18 years in a factory that manufactured small boats, a job that he enjoyed. Because of the persistent and work-related nature of his complaints, his case was subsequently re-evaluated.

In the factory, the patient prepared plastic boat moulds using fibreglass and layers of viscous polyester resin, which were applied with both a spray gun and a roller. During this procedure, he used appropriate protective clothing, a fresh-air mask, and industrial rubber gloves. He then used a mechanical sander to sand the boat mould, creating a large amount of dust, which was present throughout the single-room factory. During the sanding procedure, he did not use gloves.

Material safety data sheets listed the presence of cobalt 2-ethylhexanoate (<0.3% wt/wt) (syn. cobalt octoate) as an accelerator in the polyester resins (Norpol Topcoat®, Gelcoat®, and

SP®, all from Reichhold Danmark A/S, Kolding, Denmark).

Patch testing was repeated with the department's baseline series supplemented with pet.-based allergens selected from an acrylate, an epoxy and an isocyanate series (Chemotechnique AB). The patient was also tested with a selection of his own samples, appropriately diluted, plus two cobalt salts (Table 1). The tests were read at D3 and D7, and showed strong allergic reactions to the cobalt salts and a weaker reaction to nickel sulfate (Table 1); all other test results were negative.

Twenty-five consecutive eczema patients were tested as controls with the additional cobalt salts, and all were negative apart from one cobalt-allergic patient, who reacted to all three samples.

The factory employed only five workers, and there were no alternative jobs that the patient could perform that were free of exposure to the dust and polyester resins. He was recommended to change his occupation, owing to the persistent nature of his problem, and his dermatitis healed completely.

Discussion

Unsaturated polyester resins are widely used in the manufacture of reinforced plastic products for the marine, transportation and construction

industries (1). These resins require the addition of catalysts and accelerators for the curing process. Allergic contact dermatitis caused by the resin itself is rare (1), but can be caused by these additional chemicals.

Cobalt naphthenate and cobalt 2-ethylhexanoate (syn. cobalt octoate) can both be used as accelerators in polyester resins. There have been several reports of allergic contact dermatitis resulting from cobalt naphthenate (2), but only two cases in which cobalt 2-ethylhexanoate was reported as an occupational allergen (3, 4). There has been a report of a patient with contact allergy to cobalt naphthenate who did not react to cobalt chloride (5), but it is likely that most cases will be discovered by reaction to the cobalt chloride patch test in the baseline series. It should be noted, however, that the bioaccessibility of cobalt compounds varies (6).

The frequency of polyester resin use in the marine, transportation and construction industries emphasizes the need to consider cobalt as a sensitizer in this type of occupational setting.

Conflicts of interest: The authors have declared no conflicts.

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