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Allergic contact dermatitis caused by undisclosed thiurams in a patch test tubular net

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doi:10.1111/cod.12316

Key words: allergic contact dermatitis; elastic tubular; gas chromatography; net; thiuram.

Bandages and elastic tubular nets are materials used in the hospital environment. Thiuram can unexpectedly be present in these materials, causing allergic contact dermatitis.

Case Report

A 49-year-old male carpenter was referred with a 20-year history of dermatitis on the hands and wrists, which the patient attributed to his work. Patch testing with the baseline series of the Grupo Español de Investigación en Dermatitis de Contacto y Alergia Cutánea (GEIDAC) was undertaken. The allergens were tested on the upper back with the Curatest[®] patch test system, and removed after 2 days. During this process, we routinely use a mesh (Tubifix[®]) (Fig. 1a) to ensure better skin contact. The readings were performed according to ICDRG guidelines. On D2, there was a positive reaction to the thiuram mix 1%, and an erythematous, oedematous, blistering reaction in the contact area of the net that was perfectly limited to the area of tubular net contact (Fig. 1b). On D4, there was a 3+ reaction to the thiuram mix 1%, and the eczema associated with the holding mesh was intensified. After 15 days, patch testing was undertaken again with the tubular net on both sides and moistened, and positive reactions were observed at the D2 and D4 readings.

The mesh used to fasten the patch test (Tubifix[®]) is composed of 100% cotton, according to the manufacturer's information. Suspecting the presence of rubber, or

a rubber accelerator, we undertook gas chromatography analysis for thiuram in a '100% cotton' sample of the mesh with an Agilent Technologies (Santa Clara, CA, 95051, USA) Chromatograph 7890A, using gas chromatography coupled with mass spectrometry. We analysed two types of samples: 100% cotton mesh (the original Tubifix[®]) and a control ('pattern') mesh with [tetramethylthiuram disulfide (TMTD), tetraethylthiuram disulfide (TETD), and tetramethylthiuram monosulfide (TMTM)].

In order for thiurams to be analysed with this technique, prior derivation patterns (and samples) with trifluoroacetic anhydride are required. Therefore, the components that we found in the chromatograms are thiuram derivatives with their corresponding mass spectra. During the analysis process, we obtained the *N,N*-dimethyltrifluoroacetamide derivative, which came from TMTD and TMTM. Therefore, the presence of *N,N*-dimethyltrifluoroacetamide indicates that the tubular net has thiuram in its composition (3–5). The results indicated the presence of thiuram (TMTM) in the sample in a proportion of 9.5 ppm (9.5 mg/kg).

Discussion

Thiurams are used as a vulcanizing accelerator in the manufacture of rubber products. The prevalence of thiuram sensitization in Europe is 1.7–2.4% (1). In an epidemiological study in Valladolid, Spain, with 1902 patients, a prevalence of 3.3% was reported, and occupational exposure was a significant risk factor for sensitization (2). In our Department of Dermatology, we routinely use an elastic tubular mesh, Tubifix[®], to perform the patch tests, to reduce movement of the test chambers. The manufacturer initially claimed that the mesh is 100% cotton. We contacted the manufacturer to inform them of

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Conflict of interest: The authors declare no conflict of interests.

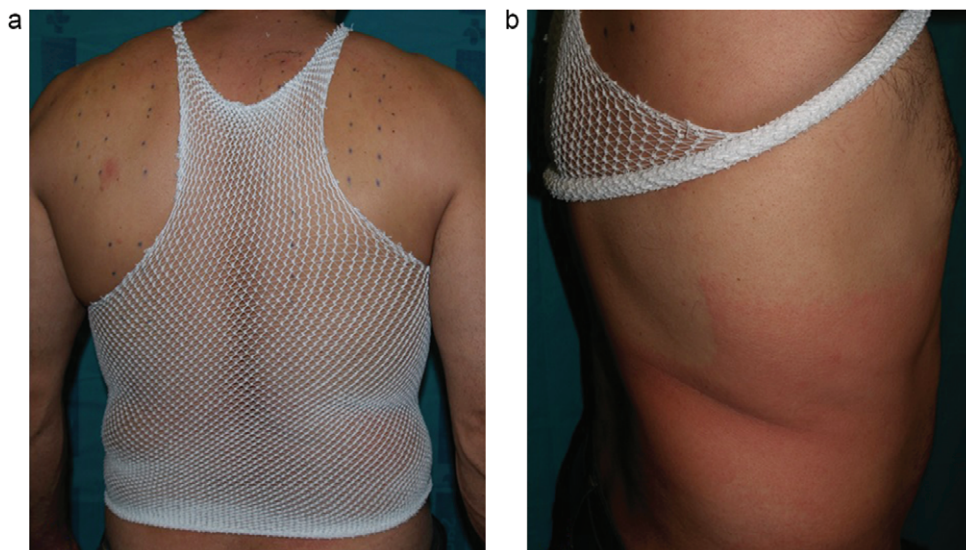


Fig. 1. (a) Tubifix® mesh used to ensure better skin contact of the patch test. (b) Erythematous oedematous reaction in the contact area of the net.

our findings and our patient's allergy. They then sent us additional information on the mesh's composition: 100% cotton (82% of the mesh) and a rubber thread coating (18%).

In conclusion, we present the case of a patient with allergic contact dermatitis caused by thiuram, which was

evident after a patch test showing an acute skin reaction to the tubular net. Gas chromatography coupled with mass spectrometry enabled us to determine the initially undeclared presence of thiurams and to diagnose our patient accurately.

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