

Cobalt-induced anaphylaxis, contact urticaria, and delayed allergy in a ceramics decorator

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Metals are the most common causal agents of allergic contact dermatitis. Immediate allergic reaction to metals or the co-existence of immediate and delayed reactions are very rare (1).

Case Report

A 39-year-old non-atopic woman, employed as a ceramics decorator from 2000, developed eczematous skin lesions on the back of her hands and forearms 3 months after starting the work. The condition was recurrent but disappeared during prolonged periods off work.

After 5 years of working, she developed generalized urticaria; angioedema of the face, lips, and tongue and general fatigue after using the blue paint containing cobalt chloride (Glass and

Ceramics Institute, Warsaw, Poland). She was moved to a different job at the same factory, and all the symptoms receded. In 2007, (i) she was patch tested with the European baseline series of contact allergens (Chemotechnique Diagnostics, Malmö, Sweden) according to International Contact Dermatitis Research Group criteria; (ii) she was prick tested with common aeroallergens (commercial kit; Allergopharma, Reinbek, Germany); (iii) she was prick tested with cobalt chloride (1 and 0.1 mg CoCl₂/ml), potassium dichromate (1 and 0.1 mg K₂CrO₄/ml) and nickel sulfate (10 and 1 mg NiSO₄/ml) dissolved in water and performed as described by Kanerva et al. (2), the same tests with metals were also performed in 10 healthy volunteers; (iv) serum samples from the patient were analysed for metal-specific immunoglobulin E (IgE) using the HY-TEC specific and total IgE enzyme immunoassay (Hycor Biomedical Inc., Irvine, CA, USA); and (v) a challenge test with the patient painting pottery using the blue paint containing cobalt chloride from the workplace was carried out.

Patch tests showed reactions to cobalt chloride and nickel sulfate (both +++ at 2 and 4 days). Prick tests were negative with common aeroallergens, potassium dichromate and nickel sulfate, whereas positive with cobalt chloride (both 1 and 0.1 mg/ml dilutions). All prick tests with metals were negative in the healthy volunteers. The level of cobalt-specific IgE was 2.97 IU/ml (class 2), while chromium- or nickel-specific IgE was not found in patient's serum.

The challenge test was also positive. After 30 min of painting, the patient developed the first symptoms of urticaria: the wheals appeared on her hands and forearms, followed by oedema of her face, lips, and tongue and hands 20 min later (Figs. 1 and 2). Despite stopping exposure, an anaphylactic reaction developed over the next 30 min: blood pressure fall (from 120/80 mmHg to 80/60 mm Hg); tachycardia 110/min (75/min before challenge) and pale skin with sweating, abdominal cramps, nausea, vomiting, diarrhoea and dizziness. After administration of intravenous corticosteroids, the symptoms receded.

Discussion

Cases of contact urticaria caused by cobalt (3) or cobalt-induced asthmatic



Fig. 1. Urticarial wheals and oedema of hand 50 min after challenge test.



Fig. 2. Hands of the patient before challenge test.

reactions in workers exposed to hard metal dust have been only rarely reported (4, 5). The mechanism of the former may be non-immunological and that of the latter is unclear but increased serum IgE to cobalt, which is indicative of type I reaction, has been reported (6). Cobalt-induced occupational asthma associated with systemic symptoms such as fever, arthralgia, and myalgia was observed in a glassware factory worker (7). There are a few reports of hypersensitivity reactions to vitamin B₁₂, which contains cobalt (8). To our knowledge, the present report concerns the first case of an individual who developed allergic contact dermatitis caused by cobalt and nickel and then immediate hypersensitivity to cobalt presenting as contact urticaria before progressing to an anaphylactic reaction. The patch tests confirmed the delayed-type hypersensitivity caused

by cobalt; the course of the disease, positive prick tests to cobalt, cobalt-specific IgE in serum, and positive challenge test indicate the IgE-mediated mechanism of allergy to cobalt.

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