

Allergic contact dermatitis to ethylene oxide

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Ethylene oxide is rarely reported as a contact allergen. This may be partly because of difficulties in patch testing; ethylene oxide is a gas with irritant properties.

Comparative testing and testing with chemically related products can be useful to prove a contact allergy, as shown with the patient described here.

Case Report

A 35-year-old nurse presented with a 2-month history of bilateral eczema affecting her forearms.

The dermatitis appeared 1 month after she had started working on the catheterization unit of a hospital. For these invasive procedures, she had to wear green, surgical cotton gowns sterilized with ethylene oxide. The patient also used antiseptic skin cleansers and occasionally hand creams.

There was no history of atopy or any contact allergy.

Patch testing was performed with the European baseline series, a pharmaceutical and cosmetic series, her own products (including different hand creams and skin cleansers) as well as with a piece of the surgical gown that had been sterilized and another piece that had not been sterilized with ethylene oxide.

A reaction was seen with nickel at D2 (+) and D4 (++) and with the sterilized gown only at D2 (++) and D4 (++).

A delayed-type hypersensitivity reaction to ethylene oxide was suspected, and to add further weight to this, the patient was also tested with a chemically similar substance, epichlorohydrin (1% eth.), to which a 1+ positive reaction was seen after 2 and 4 days (1).

Discussion

Ethylene oxide is a gas capable of killing micro-organisms at low temperatures. It is used to sterilize various medical instruments and supplies (e.g. plastic devices and textiles) that would not tolerate sterilization by heat.

As ethylene oxide is genotoxic and carcinogenic in rats and mice, studies have been performed to establish its effects on hospital and sterile supplies department workers (2). Reported adverse effects on exposure to ethylene oxide mainly concern occupational exposure. These effects include irritant contact dermatitis and occasionally allergic reactions. Airborne irritant reactions have been described among pharmaceutical workers (3).

Allergic reactions can be delayed or immediate. Delayed-type reactions have been less frequently reported, which can be at least partly because of difficulties in testing. Immediate reactions, including urticaria, angioedema, bronchial asthma, and anaphylactic reactions, are mainly documented in dialysis patients because of their frequent contact to ethylene oxide,

triggering immunoglobulin E formation (4).

Being a gas, there is no standardized patch test technique for ethylene oxide, and being irritant, the differentiation between an irritant reaction and an allergic reaction may therefore be difficult.

A comparative test with material that was sterilized or not sterilized with ethylene oxide can be useful as shown before with suture material and a surgical gown (5, 6).

Confirmation of an allergic contact dermatitis can be obtained by performing patch testing to a similar epoxy compound such as epichlorohydrin and epoxyp propane, as suggested by Birnie and English (1). In our patient, we used comparative testing with a piece of textile that was sterilized or not sterilized with ethylene oxide as well as with epichlorohydrin, both confirming the diagnosis of an allergic contact dermatitis.

References

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