

Allergic contact dermatitis to silicone in a continuous positive airway pressure mask

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Case report:

A 57-year-old Caucasian non-atopic man was referred for evaluation of a chronic face rash. He would develop itchy, oozing, crusted red plaques and patches on the face where his continuous positive airway pressure (CPAP) mask would rest (brand Swift FX manufactured by Resmed, Australia) (Figure 1A). He routinely cleaned the mask with dilute vinegar only. He had similar reactions from the frame of his plastic reading glasses.

Patch testing was performed in the typical fashion.¹ The patient was tested to a standard, supplemental, rubber, plastic/glue, and acrylate series. In addition, he was tested to shavings of the plastic frame from his eyeglasses and a piece of his silicone CPAP mask. To reduce in-person clinic exposure amidst the ongoing SARS-CoV-2 pandemic, the assessment was limited to a single delayed reading performed at 120 hours. Positive reactions were seen to his silicone CPAP mask (++ , Figure 1B) and to his reading glasses (++ , Figure 1C). Additional positive reactions were to linalool (+), drometrizole (+), and 2-hydroxyethyl methacrylate (+). All other patch tests were negative.

The patient was counseled to wear only metal eyeglasses. The mask manufacturer denied that any of the chemicals found on patch testing were present in the CPAP mask. Manufacturer information for the glasses was not available. The patient declined further investigation of his reactions with patch testing as he found an alternative mask that did not cause a reaction.

Discussion:

This case highlights allergic contact dermatitis to silicone in a CPAP mask established by positive patch testing directly to the silicone mask itself. The patch testing was performed with a new mask, eliminating the possibility of a reaction to a cleaning agent or residue on the mask. He was also found to be allergic to plastic shavings from reading glasses. His concomitant reactions to drometrizole and 2-hydroxyethyl methacrylate were hypothesized to be relevant to this

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reaction to plastics because these two chemicals are frequently used in plastics manufacturing, but we could not confirm they were specifically in his glasses. In contrast, discussion with the CPAP manufacturer confirmed the mask was made of silicone only and that drometrizole and 2-hydroxyethyl methacrylate were not used in making the mask. Thus, his reaction to plastic in his glasses as well as drometrizole and 2-hydroxyethyl methacrylate was felt to be unrelated to his mask dermatitis. Deeper chemical analysis such as mass spectrometry of the silicone mask or plastic glasses was not performed. In sum, despite extensive testing, we did not find any compounds besides silicone that could explain our patient's allergic contact dermatitis.

Allergic contact dermatitis to silicone is exceedingly rare. Allergic contact dermatitis has so far only been reported with neoprene but not silicone CPAP equipment, specifically from dialkyl or diethyl thioureas in neoprene and p-tert butylphenol formaldehyde resin in glue.^{2,3,4} Although thought to be biologically inert, there are increasing reports of contact allergy to silicone from medical devices including ventriculoperitoneal shunts, breast prostheses, and cosmetic fillers, suggesting silicone is able to induce a delayed contact allergy.⁵⁻⁸

Allergic contact reaction to silicone remains controversial. Indeed, prominent silicone manufacturers argue against "silicone allergy" and instead note that other components in manufacturing such as ethylene oxide for product sterilization or residual byproducts from the decomposition of silicone vulcanization agents are to blame.⁹ They recommend a careful investigation of the manufacturing methods of the implicated medical device but this data is often difficult if not impossible for patients and practitioners to obtain because manufacturing techniques may be proprietary and because methods and ingredients change over time.

Our patch testing and discussion with the mask manufacturer most support silicone as the culprit allergen. However, as in our case and in other contact allergy cases from silicone medical devices, it can be challenging to obtain comprehensive manufacturing data. Without deeper chemical analysis of the mask piece, such as mass spectrometry, we rely on the manufacturer to be forthcoming regarding the manufacturing process. Thus, it is possible that the culprit allergen for our patient's mask dermatitis is an unidentified chemical or even 2-hydroxyethyl methacrylate or drometrizole mixed with the silicone during mask manufacturing but not reported to us by the manufacturer's representative. Further investigation is warranted to understand allergic reactions to silicone medical devices.

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Figure legends:

Figure 1. (A) Affected areas on the face. (B) ++ reaction to silicone CPAP mask (piece from testing is shown) and (C) ++ reaction to frame of plastic reading glasses.

