

BRIEF REPORT

Pediatric Dermatology 1–2, 2010

COLOPHONY, A HIDDEN ALLERGEN ON ECG ELECTRODES IN A BOY AFTER CARDIOVASCULAR SURGERY

Abstract: We report on the first case identifying colophony as a hidden allergen in declared acrylate-based conductive and adhesive foam electrodes. This surgery was followed by continuous electrocardiogram monitoring. The patch tests showed strong positive reactions to colophony. The presence of colophony on the electrocardiogram electrodes was not declared, but it was used in the soldering process during manufacture, which deposited a small amount that was sufficient to induce sensitization.

Several reports of contact dermatitis from ECG-monitoring electrodes have been published in the literature (1–3), but only one concerned contact dermatitis from colophony in ECG electrodes (4). We report on the first case identifying colophony as a hidden allergen.

CASE REPORT

A 14-year-old boy was referred to our department because of dermatitis at the site of the application of ECG electrodes. During his childhood, he underwent long-term ECG monitoring many times because of a congenital aortal defect. No adverse reactions to the ECG electrodes were observed at that time. After cardiovascular replacement of aortal valvulae, he underwent continuous ECG monitoring. The solid adhesive hydrogel electrodes (H92SG Tyco Healthcare Kendall, Mansfield, MA) were affixed to his chest wall. Five days after surgery, confluent erythematous papules, and vesicles developed at the electrode sites (Fig. 1). The patient had no previous history of atopic dermatitis, contact dermatitis, or any other allergy, including contact hypersensitivity. The portion of the solid adhesive hydrogel electrodes that was in contact with skin was made by an Ag/AgCl tracking eyelet and which was coated with acrylic-based conductive and adhesive foam on which the solid hydrogel was mounted. We could not obtain the exact ingredients in the hydrogel from the manufacturer, so we chose to perform a patch test with

acrylate-based allergens in addition to the European baseline series (Trolab[®] Hermal, Reinbeck, Germany), propylene glycol (5% in petrolatum (pet) and chloroxylenol (1% pet). We did not retest the piece of ECG electrode. Readings were performed at 48, 72, and 96 hours according to the International Contact Dermatitis Research Group guidelines (5). The patch test showed strong positive (3+) reactions to colophony (Fig. 2). All other substances tested negative. Treatment with bethametasone valerate 0.1%/fusidic acid 2% cream (Fucicort[®] crm, LEO Laboratories, Dublin, Ireland) successfully cleared up the eruption in 10 days.

DISCUSSION

Colophony is a well-known contact allergen, with 4.0% of eczema patients being colophony-sensitive (6). It is composed of about 90% resin acids and 10% neutral substances. Colophony can cause contact eczema, type I hypersensitivity, and photosensitivity. The principal allergens in colophony have not yet been determined (5,6). Oxidation products of abietic acid and dehydroabietic acid have been identified as allergens, but synthetically prepared derivatives and the neutral



Figure 1. Contact dermatitis after application of ECG electrodes.

DOI: 10.1111/j.1525-1470.2010.01091.x



Figure 2. Positive patch test to colophony (96 hours).

fraction also contain allergenic compounds (5). Colophony is used in more than 300 different types of products – soldering flux, cutting fluids, plaster, dentistry products, glues in shoes, insulating tapes, ostomy appliances, adhesives, paints, cosmetics, printing inks, and polishes (5,6). The use of adhesives based on acrylate polymers has reduced colophony contact dermatitis (5,6); however, colophony or its derivatives may still be used in soldering flux paste, and the other products can contain colophony residues.

We detected a positive patch test reaction to adhesive ECG electrodes due to colophony in the boy after continuous ECG monitoring following cardiovascular surgery. According to the information provided by the manufacturer, colophony was not a normal part of the electrode or hydrogel, but they admitted using colophony during the soldering process of the metal contact plate. Prolonged skin contact and occlusion dissolved the colophony residues in the contact area and caused sensitization in the previously non-sensitized child. After exchanging the ECG electrodes, the skin problems rapidly resolved.

Various allergens in ECG monitoring electrodes have been reported: propylene glycol in gel (1), *p-tert*-butylphenol-formaldehyde resin (2), and recently, acrylates (3). We found only one report of colophony-induced contact dermatitis because ECG electrodes (4).

ACKNOWLEDGMENT

This study is supported by grant VZ FNM MZO 00064203/6904. We thank Professor Steve Diskin, Ph.D., for his language assistance.

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