

BRIEF REPORT

Allergic contact dermatitis to methacrylates in ECG electrode dots

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ABSTRACT

Acrylates are used widely in acrylic nails, dental restorative materials, paint, varnish, printing ink, adhesives, glue, orthopaedic prostheses, bone cement and diathermy pads. This is the first case of allergic contact dermatitis to methacrylates in electrocardiogram electrode dots reported in the literature.

Key words: acrylate, adhesive, allergic, cardiac, chest, ECG electrode, irritant, patch testing, rash, sensitisation.

INTRODUCTION

Acrylates are used widely in acrylic nails, dental restorative materials, paint, varnish, printing ink, adhesives, glue, orthopaedic prostheses, bone cement and diathermy pads. Allergic contact dermatitis (ACD) to acrylates in acrylic nails^{1,2} and dental restorative materials^{3,4} has been extensively reported. One case of ACD to acrylates in electrocardiogram (ECG) electrode dots is reported in the literature, with ethyl acrylate identified as the most likely causative allergen.⁵ We describe a case of severe ACD to methacrylates in ECG electrode dots. To our knowledge this is the first reported case of ACD to methacrylates in ECG dots in the literature.

CASE STUDY

A 51-year-old mother presented with multiple pruritic, erythematous and subsequently vesicular plaques at sites where Red Dot 3M (3M, St Paul MN, USA) ECG monitoring electrodes had been applied for cardiac investigations. The

patient had suffered from chronic fatigue syndrome since 1987 and had not worked subsequently. There was a personal history of allergic rhinitis but no other personal or family history of atopy and known allergies to amoxicillin, metronidazole, carbimazole and co-trimoxazole. There were no domestic exposures of note.

The patient was being investigated for nocturnal tachycardia, and there was an ongoing need for the use of ECG electrodes in cardiac event monitoring. She had tried 'hypoallergenic' dots, but these had still caused skin reactions. The patient had initially tried Red Dot 3M product number 2570, and was then advised to try 2231 and 2238, but reacted to all.

Patch testing was performed with the Australian baseline patch test series,⁶ the acrylates adhesives series and the patient's own samples. Allergens used for patch testing were obtained from Chemotechnique Diagnostics (Malmö, Sweden) and applied to the back using Finn Chambers (SmartPractice, Phoenix, AZ, USA) on Scanpor (Epitest OY, Tuusula, Finland). The patches were removed after 48 h and test readings were performed at day 2 and day 4. The patient had a 2+ reaction to tetraethylene glycol dimethacrylate and a 1+ reaction to 1,4-butanediol dimethacrylate on both day 2 and day 4. The patient also reacted to her Red Dot 3M ECG electrode dot samples. We could not ascertain any history of past reactions or exposure to acrylates apart from her use of ECG electrode dots and the occasional dental filling.

3M electrode dots consist of a stainless steel or radiolucent stud, with a solid centre gel, an outer annular adhesive and a foam backing. Upon our enquiry, the manufacturer of 3M informed us that the solid gel contains several acrylates, including methacrylates and isooctyl acrylate, a polyether polymer, sodium chloride and potassium chloride. The outer adhesive contains the same methacrylates as the solid gel. The manufacturer of 3M declined to disclose the specific methacrylates used in these products, and cited the

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Abbreviations:

ACD	allergic contact dermatitis
ECG	electrocardiography

protection of their patent as their rationale. Thus, it was difficult to ascertain whether the specific methacrylates that the patient reacted to on patch testing (tetraethylene glycol dimethacrylate and 1,4-butanediol dimethacrylate) were the same methacrylates contained in the ECG dots, or whether a cross-reaction to different methacrylates in the ECG dots could account for the patient's symptoms. After trialling several other ECG dot brands without an improvement in her symptoms, a Unilect electrode (Unomedical, Birkerød, Denmark) dot designed for use in patients with acrylic adhesive allergies was used with the patient's next Holter monitoring and no skin reaction developed.

CONCLUSION

Acrylates have a broad range of commercial applications and their use has continued to increase since their development in the 1930s, as has the incidence of acrylate-induced ACD.⁷ In the medical field, ACD to acrylates has been reported with the use of orthopaedic cement, prostheses, disposable diathermy pads and, in one case, to ECG electrode dots.^{5,8}

Case reports in the literature of ACD to ECG electrode dots have implicated several allergens, including propylene glycol,^{9,10} *p*-tert-butylphenol formaldehyde resin,¹¹ colophonium,¹² para phenylenediamine¹³ and preservatives such as tragacanth gum¹⁴ and parachlorometaxylenol.¹⁵ The only other case report identifying acrylates as the allergen responsible for contact dermatitis to ECG electrode dots was published in 2001,⁵ and in that study the patient reacted to hydroxyethyl acrylate 0.1% pet. (+), urethane diacrylate aliphatic 0.1% pet. (+), butanediol diacrylate 0.1% petrolatum (pet.) (+), and above all to ethyl acrylate 0.1% pet (++) , and to the T 601 Dorvit Skintact (Leonhard Lang Innsbruck, Austria) ECG electrode.

In summary, our patient developed ACD to certain ECG electrode dots and this was beginning to compromise her cardiac investigations. ACD to acrylates in ECG electrode dots is fortunately very uncommon, but should be considered in the differential diagnosis for patients who develop skin reactions to their ECG dots. Patch testing was critical in identifying methacrylates as the most likely offending allergen in this case, and cooperation with the manufacturers helped in the search for an alternative product for our

patient. Unilect acrylate-free electrode dots appear to be a good alternative to other brands in this group of patients.

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