

CONCISE COMMUNICATION

Contact dermatitis due to ultrasound gel: A case report and published work review

François CHASSET,^{1,2} Angèle SORIA,^{2,3,4} Philippe MOGUELET,⁵ Alexis MATHIAN,^{3,6} Yvain AUGER,⁶ Camille FRANCÈS,^{2,3} Stéphane BARETE^{1,2,3}

¹Unit of Dermatology, Pitié-Salpêtrière Hospital, ²Service of Dermatology and Allergy, Tenon Hospital, AP-HP, ³Sorbonne University, UPMC, ⁴Inserm U1135, Centre Maladies Immunology and Infectious Disease Center (CIMI-Paris), ⁵Service of Pathology, Tenon Hospital, and ⁶UHSI, Pitié-Salpêtrière Hospital, AP-HP, Paris, France

ABSTRACT

Adverse skin reactions with ultrasound gel are rare and related mostly to allergic contact dermatitis or contact urticaria. We report an allergic contact dermatitis with Doppler ultrasound gel applied in a 67-year-old man. The patient developed atypical purpuric cutaneous presentation located on vascular axes. Semi-open test with ultrasound gel and patch test with phenoxyethanol were followed by the same clinical purpuric eruption which strongly suggested the accountability of this later component as allergen. Based on this observation, we present a review of published work with a focus on clinical features and allergens involved in ultrasound gel cutaneous reaction.

Key words: allergic contact dermatitis, eczema, patch-test, phenoxyethanol, ultrasound.

INTRODUCTION

Ultrasound examination is considered as a safe radiological procedure.¹ Adverse skin reactions with Doppler ultrasound gel are rare. We report an allergic contact dermatitis with Doppler ultrasound gel due to phenoxyethanol. Based on this observation, we present a review of published work with a focus on clinical features and allergens involved in ultrasound gel cutaneous reaction.

CASE REPORT

A 67-year-old Caucasian man without history of atopy was hospitalized for staging of a rectal cancer. He had recent history of a venous leg ulcer. Several days after hospitalization he developed dermatitis of the hands after using an emollient (Dexeryl® [Laboratoires Pierre Fabre, Boulogne, France] containing liquid paraffin, glycerol, petroleum, glycerol monostearate, stearic acid, polydimethylcyclsiloxane, silicone oil, macrogol, triethanolamine, propyl paraben) given by caregivers for skin dryness at the beginning of the hospitalization. A few days later, he developed a skin eruption with non-infiltrated purpuric purple plaques with crumbled edges of the neck, abdomen and lower limbs located on the vascular axes (Fig. 1a,b). Eruption had occurred 36 h after arterial Doppler with ultrasound gel Premium® (Euro Diffusion Medical Imaging, Sarcelles, France). The manufacturer provided the complete list of components which contained carbopol 0.55%,

triethanolamine 0.50% and Phenonip® (Clariant International, Muttenz, Switzerland) (a mix of phenoxyethanol, and methyl, ethyl, butyl, propyl and isobutyl parabens) 0.40% and water.

European standard, antiseptic and cosmetic series were positive for thiuram mix (+), balsam of Perou (+), fragrance mix I (++) , fragrance mix II (+) and Lyrall® (Chemotechnique Diagnostics, Vellinge, Sweden) (+) without current clinical relevance. Phenoxyethanol was positive (1% pet.) (+) and was purpuric such as the initial eruption (Fig. 1c). Paraben mix (16% pet.) was also positive (+) (Fig. 1d); but patch tests with ethyl, butyl, methyl and propyl parabens alone (3% pet. Chemotechnique Diagnostics, Vellinge, Sweden) were negative at D2 and D4. Patch tests with isobutyl paraben and carbopol were not performed because they were not available in our department and did not exist as a commercialized patch test, respectively. Semi-open test with colorless ultrasound gel Premium® (Fig. 1e) and repeating open application tests with Dexeryl® (Boulogne, France) were also positive (+) at D1. Patch test with triethanolamine contained in the gel was negative.

Skin biopsies on both clinical purpuric and semi-open test induced by ultrasound gel lesions showed a similar histological spongiotic pattern consistent with allergic contact dermatitis: normal stratum corneum, slight spongiosis and small vesicles within epidermis, associated with a mild superficial dermal infiltrate of lymphocytic and eosinophils around intact capillaries (Fig. 1f).

The evolution was favorable with topical corticosteroids and eviction of both Dexeryl® and ultrasound gel.

Correspondence: Stéphane Barete, M.D., Ph.D., Unité de Dermatologie, Hôpital Pitié-Salpêtrière 47-83 bd de l'Hôpital, F-75013, Paris, France. Email: stephane.barete@psl.aphp.fr

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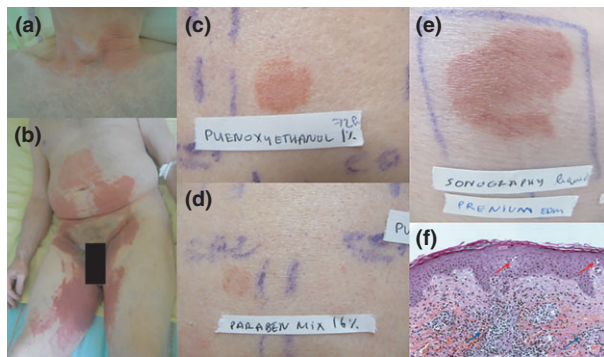


Figure 1. (a,b) Non-infiltrated purpuric purple plaques of the neck, abdomen and lower limbs located on vascular axes. (c,d) Positive patch tests for phenoxyethanol 1% pet. (+) and paraben mix (butyl/methyl/propyl/ethyl paraben 4% each) at D4. (e) Positive semi-open tests with colorless ultrasound gel Premium with purpuric aspect similar to the initial eruption. (f) Skin biopsy pathology (hematoxylin–eosin, original magnification $\times 400$) shows slight spongiosis, small vesicles indicated by blue arrows, mild dermal infiltrate of lymphocytes and eosinophils as indicated by red arrows.

DISCUSSION

We reported the first case of contact dermatitis due to phenoxyethanol contained in Phenonip® of an ultrasound gel.

Phenoxyethanol is probably involved because patch tests with the other tested components of the ultrasound gel were negative and because patch tests with this component such as observed at the initial presentation were both purpuric and had the same histological pattern. Phenoxyethanol is rarely involved in contact dermatitis with a positive patch-test range between 0.20% and 0.24% in large series.^{2,3} Probably, in this case, parabens and particularly paraben mix with a “compound effect” had an added irritating effect, because of positive patch test with paraben mix, despite negative test with each paraben alone. In a recent review, the prevalence of sensitization to parabens is below 2% in two-thirds of the series.^{3,4} The diagnosis was difficult to establish between irritant reaction or co-sensitization with parabens because of positivity observed in case of repeated open tests with Dexeryl® (containing propyl paraben). This sensitization might have occurred because of the patient’s leg ulcer as previously described in wound skin.⁵ Sensitization might have occurred at the beginning of hospitalization when the patient first used Dexeryl® and determined the development of hand dermatitis. Nevertheless, both patch test and repeated open test were weakly positive with erythema and we finally attained a diagnosis of irritant reaction rather than co-sensitization. Furthermore, it has been shown that irritant dermatitis enhanced the induction of allergic contact hypersensitivity.⁶

So far, 14 cases of contact dermatitis linked to ultrasonic gel have been reported in the published work. The clinical

Table 1. Published work review of reported cases for contact dermatitis with ultrasound gel

Authors	Year	Ultrasound gel	Incriminated component (concentration used for skin tests)	Clinical features	Skin injury
Tomb <i>et al.</i> ¹	1987	NA [†]	NA	ACD [‡]	NA
Ayadi <i>et al.</i> ²	1987	NA	Propylene glycol (NA)	ACD	NA
Gebhart <i>et al.</i> ³	1993	NA	Euxyl K 400: MDBGN [§] (NA)	ACD	NA
Villa <i>et al.</i> ⁴	1998	NA	Negative prick test	Anaphylaxis [¶]	No ^{††}
Leitner <i>et al.</i> ⁵	1999	NA	Euxyl K 400 no precision	ACD	NA
Ando <i>et al.</i> ⁶	2000	NA	Imidazolidinyl urea (NA)	ACD	NA
Erdmann <i>et al.</i> ⁷	2001	NA	Euxyl K 400: MDBGN (0.3% pet.)	ACD	No
Eguino <i>et al.</i> ⁸	2003	NA	Propylene glycol and parabens (NA)	ACD	NA
Horiguchi <i>et al.</i> ⁹	2005	Newark: ultraphonic conductivity gel	Propylene glycol +++ (10% pet.), + (1% and 0.1% pet.)	ACD	Yes
Zeitz <i>et al.</i> ¹⁰	2007	Henleys	Negative patch test with gel components	Urticaria	No
Moreno <i>et al.</i> ¹¹	2009	Aquasonic®, Parker Laboratories	Propylene glycol (2% aq.)	ACD	No
Gonzalo-Garjón <i>et al.</i> ¹²	2011	NA	Negative prick test with gel components	Urticaria ^{‡‡}	No
Madsen <i>et al.</i> ¹³	2014	EKO Gel®	MI ^{¶¶} (0.2% aq.)	ACD	No
Verdelli <i>et al.</i> ¹⁴	2014	NA	MCJ ^{§§} (0.01% aq.) MI ^{¶¶} (0.01% aq.)	ACD	No
Chasset <i>et al.</i>	2015	Ultrasound gel Premium®	Phenoxyethanol (+) (1% pet.) Triethanolamine (–) (2% pet.) Ethyl, methyl, butyl and propyl parabens (–) (3% pet.)	ACD	Yes

[†]Not available, [‡]allergic contact dermatitis, [§]methyl-4-dibromoglutaronitrile, [¶]anaphylactic reaction (glottis edema, hypotension, malaise), ^{††}intravaginal ultrasound, ^{‡‡}cold urticaria, ^{¶¶}methylisothiazolinone, ^{§§}methylchloroisothiazolinone.

features and allergens involved are reported in Table 1. The list of the references included in Table 1 is available in a Data S1. Clinical features were mostly related to allergic contact dermatitis with Euxyl® K 400⁷ and propylene glycol including one case of co-sensitization with parabens,⁸ but anaphylaxis⁹ and urticaria including cold urticaria¹⁰ were also described.

Interestingly, in the two last published cases, the allergen involved was methylisothiazolinone (MI). MI is a preservative component used for industrial and cosmetic products¹¹ and is a recent substance for newly emerging allergens in consumer products.¹² These observations have shown that MI may be present in medical devices and for some cases without being labeled.¹³

To conclude, we report an adverse skin effect with Doppler ultrasound gel due to phenoxyethanol with likely associated irritant reaction with parabens. Cutaneous adverse events due to ultrasound gel are mostly allergic contact dermatitis but anaphylaxis manifestations have been described as well. The complete list of components of the ultrasound gel obtained by direct contact with the manufacturer is recommended to identify the involved allergen.

CONFLICT OF INTEREST: None declared.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Data S1 List of complete references.

Supplemental document 1. List of references included in table 1.

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