

Systemic Allergic Contact Dermatitis After Formaldehyde-Containing Influenza Vaccination

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Abstract

Background: Systemic contact dermatitis occurs when a patient sensitized to an allergen topically is systemically reexposed to the allergen and develops a cutaneous eruption.

Objective: To report the case of a 48-year-old male who developed explosive dermatitis following injection of a formaldehyde-containing influenza vaccine and was subsequently shown to be strongly positive to formaldehyde and formaldehyde-releasing allergens by patch testing, as well as to review the literature for similar cases.

Methods: A PubMed search was made using the following search terms: systemic contact dermatitis, formaldehyde, influenza, and vaccine.

Results: A review of the literature revealed 2 cases of systemic contact dermatitis from formaldehyde derived from aspartame and 1 case from a thimerosal-containing influenza vaccine. No cases caused by formaldehyde in influenza or other vaccines were found.

Conclusion: This case highlights the importance of considering systemic allergic contact dermatitis in any patient presenting with dermatitis following injection of a formaldehyde-containing vaccine.

Résumé

Contexte : Une dermatite de contact systémique survient lorsqu'un patient sensibilisé à un allergène par voie topique développe une éruption cutanée lorsqu'il est exposé à nouveau à cet allergène par voie systémique.

Objectif : Présenter le cas d'un homme de 48 ans chez qui une dermatite violente est apparue soudainement suite à l'injection d'un vaccin contre la grippe contenant du formaldéhyde, et chez qui des tests épicutanés ont révélé par la suite des réactions fortement positives au formaldéhyde et à des allergènes libérant du formaldéhyde; effectuer une revue de la littérature pour trouver des cas semblables.

Méthodes : Une recherche a été effectuée dans la base de données PubMed en utilisant les termes de recherche suivants : « systemic contact dermatitis », « formaldehyde », « influenza » et « vaccine ».

Résultats : Une revue de la littérature a révélé deux cas de dermatite de contact systémique causée par du formaldéhyde dérivé de l'aspartame et un cas causé par un vaccin antigrippal contenant du thimérosol. Aucun cas causé par la présence de formaldéhyde dans les vaccins antigrippaux ou dans d'autres vaccins n'a été relevé.

Conclusion : Ce cas souligne l'importance d'envisager un diagnostic de dermatite de contact allergique systémique chez tout patient présentant une dermatite suite à l'injection d'un vaccin contenant du formaldéhyde.

Keywords

dermatitis, dermatology

Case Report

A previously healthy 48-year-old man was referred to the Ottawa Hospital Dermatology Contact Dermatitis Clinic after developing an acute eczematous dermatitis on the anterior chest and shoulders 48 hours after receiving the Novartis Agriflu influenza vaccine, 0.5 mL intramuscularly, to the right deltoid muscle. Severe pruritus at the time of the eruption was treated by his family physician with oral prednisone

50 mg for 5 days. His symptoms were alleviated initially but flared after the treatment, at which time he was seen in

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Figure 1. Patient's own photograph of his neck and upper chest several days after the influenza vaccination.



Figure 2. Patient's own photograph of his left forearm, several days after influenza vaccination.

consultation by dermatology and given a second, tapering dose of prednisone over 3 weeks, as well as oral cephalexin, along with topical betamethasone valerate 0.1% ointment. At the time of our assessment in the Contact Dermatitis Clinic, he was asymptomatic; the patient's own photographs taken several days into the course of his eruption demonstrated an erythematous, excoriated eruption on the neck and anterior chest extending onto the shoulders in a symmetrical distribution (Figure 1) as well as similar involvement of the antecubital fossae of the arms and the forearms (Figure 2). The patient described severe pruritus and, later in the course, development of scale throughout the affected areas.

The distribution of the postvaccine dermatitis on the patient's forearms was similar to that of a previous eruption he recalled. During the preceding summer, 24 hours after working with plywood and pressure-treated lumber, he developed an acute eczematous dermatitis on his forearms, which lasted for several weeks. At that time, he had also been regularly applying Avon Moisture Therapy Body Lotion containing imidazolidinyl urea (as indicated on the product). The patient did not recall the eruption affecting his anterior neck and upper chest.

The patient's medical history was significant for seasonal allergies, and his family history was significant for asthma and seasonal allergies in his brother and son.

Table 1. Positive Patch Test Results at 96 Hours.

Reading	Allergen
3+	Formaldehyde 2% aq
3+	Formaldehyde 1% aq
3+	Diazolidinyl urea 1% pet
1+	DMDM hydantoin 1% pet
3+	Imidazolidinyl urea 2% pet
3+	Quaternium-15 2% pet
2+	Dimethyldihydroxyethyleneurea (Fix NF) 4.5% aq
2+	Dimethyloldihydroxyethyleneurea (Fix CPN) 4.5% aq
1+	Cinnamic aldehyde 1% pet
2+	Fragrance mix I 8% pet

Abbreviations: aq, in water; pet, in petrolatum.

The patient was patch tested to the North American Contact Dermatitis Group (NACDG) standard screening series of 70 allergens (SmartPractice AllergEAZE, Calgary, Canada), the textile series (Chemotechnique Diagnostics, Vellinge, Sweden), select woods, thimerosal, and the rubber series (Trolab, Omniderm Pharma, Vaudreuil-Dorion, Canada). Patch testing was performed with a standardized technique using Finn Chambers (SmartPractice, AllergEAZE, Calgary, Canada) on Scanpor tape (Omniderm Pharma, Vaudreuil-Dorion, Canada). The patches remained in place for 48 hours, and test sites were evaluated at 48 and 96 hours after initial placement. A positive reaction was graded using the NACDG protocol.¹ Results at 96 hours are shown in Table 1.

Methods

A PubMed search was made using the following search terms: systemic contact dermatitis, formaldehyde, influenza, and vaccine.

Results and Discussion

The Novartis Agriflu influenza vaccine contains formaldehyde, which is used during the production process to inactivate the influenza virus.² No thimerosal or other preservatives are added to the final product. Our patient was likely sensitized to formaldehyde and formaldehyde-releasing preservatives through his contact with plywood and his Avon Moisture Therapy Body Lotion, containing imidazolidinyl urea. In the manufacture of plywood, veneers are bonded under high temperature and pressure with a waterproof phenol-formaldehyde resin. This creates a product that is suitable for use under conditions of extreme moisture.³ Pressed-wood products are known to be a source of exposure to formaldehyde in the general population.⁴

Systemic contact-type dermatitis can occur following systemic administration of an allergen. The first sensitizing exposure to the allergen is usually by topical application to

the skin. Patterns of systemic contact dermatitis include flare-up at earlier sites of dermatitis or sites of earlier patch test reactions, dyshidrotic hand dermatitis, generalized maculopapular-vesicular eruption, erythema multiforme, vasculitis, baboon syndrome, urticaria, and anaphylaxis.⁵ This case represents a flare-up of dermatitis at previously affected sites (the forearms) as well as a severe flare at a new site, the anterior neck and upper chest.

Systemic allergic contact dermatitis has been described following systemic exposure to formaldehyde^{6,7} as well as from influenza vaccination with a thimerosal-containing vaccine, causing a generalized maculopapular eruption.⁸ Reviews of adverse reactions to vaccines do not specifically address the risk of systemic contact dermatitis from formaldehyde in influenza vaccines.^{9,10}

Conclusion

In the context of an eczematous reaction 48 hours post vaccination and positive patch tests to formaldehyde and 4 of the formaldehyde-releasing preservatives including imidazolidinyl urea, we conclude that our patient experienced a systemic allergic contact dermatitis from formaldehyde in his influenza vaccine. Yearly vaccination against influenza remains a key public health initiative, and systemic contact dermatitis to formaldehyde in the vaccine appears to be rare. It is useful to note that the FluMist (AstraZeneca) live attenuated intranasal spray influenza vaccine does not contain formaldehyde and could be safely used in a patient such as the one presented.¹¹ This was recommended to our patient for future yearly influenza vaccination.

Authors' Note

The information in this case report has not been previously presented.

Declaration of Conflicting Interests

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