

Report

Occupational protein contact dermatitis caused by meat and fish

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Abstract

Background Protein contact dermatitis is a form of contact dermatitis possibly triggered by proteinaceous allergens.

Materials and methods We report two patients with a history of erythematous and urticarial skin reactions followed by transformation into prolonged papular symptoms upon contact with proteinaceous material.

Results The symptoms reported by the patients were reproducible by skin testing with meat (cow) and fish (salmon). Both patients experienced extracutaneous manifestations after ingestion of meat and fish, as proven by oral challenge. Specific immunoglobulin E (IgE) antibodies were detected in the patients' blood.

Conclusions Both cases meet all major criteria of protein contact dermatitis, suggesting IgE-mediated immediate-type hypersensitivity with late-phase cutaneous reactions.

The term "protein contact dermatitis" was coined by Hjorth and Roed-Petersen¹ in 1976 to describe a form of contact dermatitis observed in kitchen workers and possibly triggered by proteinaceous allergens. Subsequently, Veien *et al.*² proposed the initiation of eczematous skin changes upon contact with the causative substance, together with positive scratch test and/or radioallergosorbent test (RAST) to the respective substance, as criteria for this entity. To date, the literature comprises reports of about 80 patients meeting these criteria, which have recently been reviewed.³ We report two cases of occupational protein contact dermatitis caused by meat (cow) and fish (salmon), as demonstrated by extensive allergologic tests, including skin testing, oral challenge, and RAST.

Case reports

Case 1

A 23-year-old man has been working as a butcher for 5 years. Throughout this time, he noticed itchiness followed by an erythema within minutes upon contact with meat, particularly cow meat, at the respective contact sites, and the subsequent formation of papules. Additionally, the consumption of cooked cow meat as well as hen egg resulted in dizziness and asthma, frequently accompanied by angioedema and a generalized urticarial eruption. The latter symptoms developed within 30–60

min after ingestion, and usually resolved spontaneously after another 60 min.

In addition, the patient suffers from seasonal rhinoconjunctivitis in summer. Clinical investigation revealed a red dermographism.

A standardized skin prick test (Bencard, Worthing, UK) was positive for grass and rye pollen as well as hen egg and cow meat. Additionally, an open application test was performed with fresh raw pieces of cow meat. After 20 min, an erythema was visible at the sites of contact, and, after 24 h, multiple papules within an erythematous skin area were noted where meat had been tested. Finally, cooked cow meat was also tested by oral challenge, which yielded dizziness, falling blood pressure, tachycardia, and an erythematous eruption confined to the upper trunk and both forearms within 60 min, all symptomatic of an anaphylactic reaction towards cooked cow meat as the triggering factor. The presence of specific immunoglobulin E (IgE) antibodies was demonstrated by RAST (CAP RAST FEIA, Pharmacia, Uppsala, Sweden) (Table 1).

Case 2

During childhood, this 30-year-old man experienced a life-threatening asthma attack following the ingestion of fried trout. Since then he has attempted to avoid contact with fish. In recent years, he has worked as a manager in a restaurant, and occasionally helps out in the kitchen or serves guests.

Whenever fish meals were prepared, the vapor was sufficient to cause a feeling of obstruction in the patient's throat, accompanied by mild dyspnea within a few minutes. Additionally, urticae would develop at the patient's neck. Upon contact with fish when clearing the dishes, an erythema developed at the contact sites on the hands within minutes, together with papules in an erythematous skin area forming within the next day. These symptoms were even more pronounced when the patient had to prepare fish meals himself. Salmon was the fish the patient encountered most frequently.

In addition, the patient suffers from perennial obstruction of the nose and seasonal rhinoconjunctivitis in summer. Clinical investigation revealed a sebostatic skin type, subacute dermatitis at the palms and bends of the elbow, together with a white dermographism. The total blood IgE level was significantly elevated (1115 U/mL; normal, <120 U/mL).

A standardized skin prick test (Bencard) yielded positive results of clinical relevance for grass and rye pollen as well as house dust mite and fish. Open application of fresh pieces of salmon remained negative; however, rubbing pieces of salmon resulted in strong wheal-and-flare reactions with pseudopods. Subsequently, a prick test was performed yielding strongly positive reactions after 20 min (Fig. 1). One hour later, urticae were noted at the patient's neck (Fig. 2). At $t = 24$ h, papules were seen within erythematous skin areas at the test site of the salmon (Fig. 3), as well as at the formerly urticarial sites at the neck. The site where salmon was prick tested and rubbed were biopsied; histologic examination showed an identical picture. Beneath an unaltered epidermis, a perivascular lymphohistiocytic infiltrate was seen, exhibiting a high proportion of eosinophils and neutrophils. A patch test with salmon remained negative for 72 h. To simulate oral challenge, a small piece of salmon was placed on the patient's tongue for 60 s after which the piece was removed. Despite this minimal and short contact, the patient encountered a severe asthma attack within a few minutes which had to be treated with intravenous steroids and Adrenalin medihaler. CAP RAST FEIA analyses showed high levels of specific IgE to salmon (Table 1).

Discussion

Protein contact dermatitis is still a much debated entity despite the definition of Hjorth and Roed-Petersen¹ and Veien *et al.*² The initiation of eczematous skin changes upon contact with the causative substance, together with positive scratch test and/or RAST to the respective substance, are the criteria for establishing this diagnosis. Both patients described here have a history of erythema and wheals forming at the contact site with proteinaceous material within 20 min, together with transformation into prolonged papular reactions. This history strongly points



Figure 1 Urticarial reactions of patient 2 in prick tests to fish ($t = 20$ min).

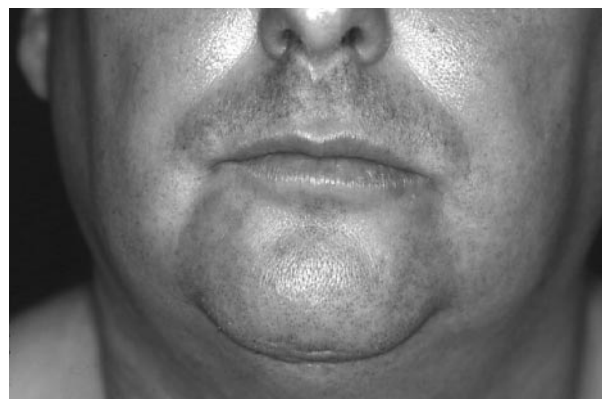


Figure 2 Development of urticae on the face and neck of patient 2 one hour after the skin prick test (Fig. 1).



Figure 3 Development of papules 24 h after prick test to salmon at the test site.

towards animal proteinaceous material as the causative substance for their symptoms. Both also developed extra-cutaneous reactions following ingestion of the allergens.

Table 1 Synopsis of the relevant allergologic tests with regard to protein contact dermatitis in both patients. All prick tests were carried out and interpreted according to the EAACI guidelines⁹

Type of test	Case 1	Case 2
Allergen	Cow meat	Salmon
Open application $t = 20$ min	Erythema	Negative
Open application $t = 24$ h	Papules	Negative
Rubbing $t = 20$ min	Not done	++++
Rubbing $t = 24$ h	Not done	Papules
Prick $t = 20$ min	++	++++
Prick $t = 24$ h	Not done	Papules
Histology	Not done	Late-phase reaction
Patch test	Not done	Negative
Oral challenge	Erythema	Asthma
RAST class	2	4

Positive prick and negative patch tests, together with the detection of specific IgE antibodies in the blood, were also documented. Thus, they fit well to the cases recently reviewed by Janssens *et al.*³ classified as protein contact dermatitis.

Interestingly, the patients described here exhibited two types of reaction in the skin tests performed. Both showed clear positive results upon prick testing. Open application of meat to the patient with the corresponding sensitization resulted in a positive reaction after 24 h when papules and a persisting erythema were seen at the test sites. This picture was identical to that obtained in the patient sensitive to fish 24 h after a rubbing test was performed. It would have been tempting to postulate a combined type I and type IV reaction in these cases. This would have been feasible, particularly as both are atopic patients and the immunoregulatory defects recently characterized in atopy would provide a means to argue for an IgE-mediated delayed allergic reaction.⁴ Moreover, a case of combined type I and type II allergic reaction to proteinaceous material has already been described.⁵ We did not detect typical changes indicative of a type IV reaction clinically (lack of papulovesicles), histologically (lack of exocytotic T

lymphocytes and spongiotic epidermis), or by skin testing (lack of positive patch test reaction). Additionally, the time course of the reaction, with a maximum after 12–24 h and a clear fading at $t = 48$ h, argues against a type IV reaction. Based on these observations and in the light of positive prick tests and positive RAST results, we propose that the test reactions as well as the clinical symptoms experienced by our patients are caused by IgE-mediated reactions, with the skin changes seen after 24 h representing late-phase cutaneous reactions. This reaction pattern has been described previously, and is characterized by a palpable reaction after 6 h,⁶ interaction of T lymphocytes with eosinophils,⁷ and a cytokine profile of T-helper-2 cells involved in IgE production.⁸

References

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