

C. PITSIOS¹, A. DIMITRIOU², K. KONTOU-FILI³

Allergic reactions during allergy skin testing with food allergens

¹Allergy Outpatient Dept, Social Insurance Institute for Hotel Employees, Athens, Greece

²Private Allergy Practice, Halkida, Greece

³Allergology Dept, Euroclinic Hospital, Athens, Greece

KEY WORDS

Food allergy, meat allergy, fish allergy, Skin prick tests, Prick-to-Prick tests, Anaphylaxis

SUMMARY

Skin testing is a reliable and safe way to diagnose IgE-mediated allergies, with rare side-effects. Two cases of systemic allergic reactions during skin testing to food allergens are hereby reported. A 28-year-old male reported allergic reactions, mild to moderate in severity, each time he tasted fish in the frame of his professional duties. During SPT and prick-to-prick to raw and cooked fishes, he presented urticaria and tachycardia. A 59-year-old male had a long history of urticaria-angioedema and asthma attacks, following the consumption of mammalian meat. He was skin-tested to various meats and during the 5 last minutes of the test he developed generalized urticaria, allergic rhinitis and conjunctivitis. They were both advised to completely avoid the relative allergens. In conclusion, skin testing, particularly prick-to-prick, may cause anaphylaxis. Tests should be performed only by physicians with proper training in allergy, experienced in treating promptly and properly episodes of anaphylaxis.

Introduction

Skin testing is the diagnostic cornerstone that confirms or rules-out IgE-mediated allergy (1, 2). Skin prick tests (SPT) with commercial food-extracts are considered to be a safe, efficient and rapid method for screening purposes in IgE-mediated food allergy (2). The "prick-to-prick" (P-P) method is performed if extracts of specific food items are not available or differences in the allergenicity of different cultivar strains exist. In the P-P method, the tester pricks first the fresh food and then the skin (2). Intradermal skin tests with food are avoided because of increased risk of a sys-

temic reaction; furthermore, intradermal food tests are characterized by increased sensitivity but low specificity (2, 3).

Although very rare, allergic reactions during skin testing have been reported and in most cases such reactions occur after P-P testing. Anaphylaxis during the performance of SPT to food extracts is extremely rare (4). Fortunately no fatalities during food allergy testing have been reported since 1984; the ones reported until then had occurred following intradermal tests (5).

In the following article two cases of allergic reactions during skin testing to food are reported. They were provoked by fish and meat P-P testing.

Cases description

Case 1

A 28-year-old male was referred for evaluation of adult onset fish allergy. Working as a cook, specialized in fish dishes, he reported repeated allergic reactions, mild (pruritus and later urticaria of the neck, axillary, genital areas) to moderate in severity (above skin symptoms + palpitations, tinnitus, gastrointestinal involvement); acute, self-limited episodes occurred each time he tasted fish or other seafood (in the frame of his professional duties), even though he did not swallow it and rinsed his mouth thoroughly. He claimed that he consumed canned tuna fish without problem. He is an atopic individual with a history of atopic dermatitis, seasonal rhinitis and asthma.

In vivo evaluation was undertaken with SPT to 4 commercial fish extracts (cod, salmon, trout and tuna, Stallergenes, France) and P-P to the offending fishes (mackerel, bogue, salmon, anchovy, bassfish, brown picarel, comber, streaked gurnard and pandora, raw and cooked). Negative (50% glycerinated HAS-saline) and positive controls (histamine dihydrochloride, 10mg/mL) were used (in both cases). In vitro evaluation of specific IgE resulted positive to cod (18kU/L).

SPT were carried out on the upper back for adequate surface area with a sterile 1 mm-tip lancet (Stallergenes, France), followed by P-P tests, a quarter of an hour later. The SPT reactions were strongly positive to all commercial extracts (more than two times greater than the histamine's wheal and flare), with histamine's mean wheal diameter of 8mm. All fishes tested by P-P resulted positive with pseudopodia but were not outlined due to the reaction that followed.

Less than fifteen minutes after starting the P-P tests, he complained of pruritus and almost instantly he broke into giant urticaria involving the neck, axillary and genital areas; in addition mild tachycardia reproduced with accuracy the clinical picture he usually developed upon fish tasting; because of the rapid progression of the reaction, a single epinephrine dose (0.3mg) was administered SC and he remained hemodynamically stable. Cetirizine (10mg) and methylprednisolone (16mg) were also administered per os. He recovered uneventfully.

He was advised to move to another cooking area of the restaurant and completely avoid the contact and the ingestion of fish. A 'rescue set' containing a 5mg levocetirizine tablet, a methylprednisolone 16mg tablet and a self-injectable epinephrine, was prescribed to him.

Case 2

A 59-year-old male reported a 10 year history of generalized urticaria-angioedema and asthma attacks following the consumption of mammalian meats; they developed 2 hours after ingesting pork, beef, lamb, goat and rabbit. Since the onset of present illness, patient has tried twice to taste small amounts of beef and lamb, but 2 hours later he developed pruritus in the axillary area, angioedema, rhinoconjunctivitis and intense dyspnea. He tolerates dairies. He was referred to the allergist in order to reintroduce meat in his diet. Past medical history included: seborrheic dermatitis, gastric ulcer, coronary disease and symptoms of exercise-induced asthma.

SPT with 4 commercial extracts to milk, beef, pork, mutton (HAL Allergy, The Netherlands), as well as P-P with both raw and cooked meat (beef, pork, lamp and rabbit), were performed simultaneously on the volar surface of the forearm. SPT to milk was negative. All skin tests to mammalian meat resulted strongly positive, with a mean wheal diameter ranging 9-13mm, with pseudopodia (histamine= 7mm). During the last 5 minutes of skin testing, the patient developed facial pruritus and erythema, urticarial lesions of the trunk, itching red eyes, running nose and sneezing. Levocetirizine and methylprednisolone were administered per os and i.m., respectively and patient recovered in 15 minutes; he was instructed to strictly avoid the consumption of mammalian meat.

Discussion

The safety of skin testing is a common experience that has been confirmed by several studies. In a large survey of more than 18,000 subjects no adverse reactions due to skin testing to food extracts were reported (6). Results of another study, regarding 16,204 patients showed that vasovagal reactions may be noticed during skin testing in 0.04% of the patients (7). Allergic reactions during the performance of P-P are considered to be an extremely rare event, with an estimated prevalence of 0.008% in food allergic patients (8). A 6.5% rate of allergic reactions due to P-P testing has been reported among 92 babies, of less than 6 months of age, tested for food allergy (9). According to the findings of the same study, involving a total of 1,152 patients aged less than 19 years old, no reactions were reported in children older than 6 months. The authors concluded that infancy, the presence of atopic dermatitis and the performance of duplicate tests are risk factors for anaphylaxis during skin testing (9).

Mammalian meat allergy is an extremely rare food allergen, even among children allergic to cow's milk, which contains common proteins with meat (10). Thermo-labile proteins - like bovine serum albumin (BSA) and the bovine serum IgG - are considered the major allergens responsible for allergy to mammalian meat, in persons who report reactions after the ingestion of medium-rare or rare meat (10, 11). It appears that heat-resistant proteins are responsible for our Case's 2 allergy, since all episodes occurred upon consumption of well-cooked meat. Six of 24 protein fractions - with molecular weight 14-66kd - detected after SDS-PAGE of raw beef, were reported to be heat-stable for up to 2 hours of heat (85° C) treatment (10).

Cross-reactivity in different mammalian meats has been reported with a frequency of 75.4% (12). Our Case 2 patient tolerates avian meat, but has reacted to different mammalian meats. That confirms the clinical cross-reactivity among mammalian meat proteins. The performance of multiple tests of cross-reactive food increased the local allergen load. Cautions could have been kept to prevent the reactions in both cases, like applying first wet pieces of food upon the skin without pricking them and perform tests gradually in more than one visits, first SPT followed by P-P (13); in Case 1 these cautions were not observed because of his claimed tolerance to tuna fish.

In conclusion, facing the rare occurrence of an allergic reaction during skin testing, physicians should avoid leaving the patient without surveillance, practicing tests without having the necessary emergency equipment and medication or testing infants with eczema and asthma using native food (2, 14). Tests should be performed only by physicians with proper training in allergy, experienced in treating promptly and properly episodes of anaphylaxis (14).

Acknowledgment

Authors wish to express their gratitude to Scott H. Sicherer, MD, for his helpful comments on a draft of this paper.

References

1. Cox L, Williams B, Sicherer S, Oppenheimer J, Sher L, Hamilton R, et al. Pearls and pitfalls of allergy diagnostic testing: report of the American College of Allergy Clinical Immunology. *Ann Allergy Asthma Immunol*, 2008; 101: 580-592.
2. Bernstein IL, Li JT, Bernstein DI, et al. Allergy diagnostic testing: an updated practice parameter. *Ann Allergy Asthma Immunol*, 2008; 100: S1-S148.
3. Sicherer SH, Teuber S, and the Adverse Reactions to Food Committee. Current approach to the diagnosis and management of adverse reactions to foods. *J Allergy Clin Immunol*, 2004; 114: 1146-1150.
4. Novembre E, Bernardini R, Bertini G, Massai G, Vierucci A. Skin-prick-test-induced anaphylaxis. *Allergy*, 1995; 50: 511-513.
5. Lockey RF, Benedict LM, Turkeltaub PC, Bukantz SC. Fatalities from immunotherapy (IT) and skin testing (ST). *J Allergy Clin Immunol*, 1987; 79: 660-677.
6. Valyasevi MA, Maddox DE, Li JTC. Systemic reactions to allergy skin tests. *Ann Allergy Asthma Immunol*, 1999; 83: 132-136.
7. Turkeltaub PC, Gergen PJ. The risk of adverse reactions from percutaneous prick-puncture allergen skin testing, venipuncture and body measurements: data from the second National Health and Nutrition Examination Survey 1976-80 (NHANES II). *J Allergy Clin Immunol*, 1989; 84: 886-890.
8. Codreanu F, Moneret-Vautrin DA, Morisset M, Guénard L, Rancé F, et al. The risk of systemic reactions to skin prick-tests using food allergens: CICBAA data and literature review. *Europ Annals Allergy Clin Immunol*, 2006; 38: 52-54.
9. Devenney I, Fälth-Magnusson K. Skin prick tests may give generalized allergic reactions in infants. *Ann Allergy Asthma Immunol*, 2000; 85: 457-460.
10. Kanny G, de Hauteclocque C, Moneret-Vautrin D-A. Food anaphylaxis to bovine serum albumine. *J Allergy Clin Immunol*, 1998; 101: 137-139.
11. Ayuso R, Lehrer SB, Lopez M, Reese G, Ibanez MD, et al. Identification of bovine IgG as a major cross-reactive vertebrate meat allergen. *Allergy*, 2000; 55: 348-354.
12. Ayuso R, Lehrer SB, Tanaka L, Ibanez MD, Pascual C, et al. IgE antibody response to vertebrate meat proteins including tropomyosin. *Ann Allergy Asthma Immunol*, 1999; 83: 399-405.
13. Dreborg S. The risk of general reactions to skin prick testing (SPT). *Allergy*, 1996; 51: 60-61.
14. Zacharisen MC. Allergy skin testing infants: a safe or risky procedure? *Ann Allergy Asthma Immunol*, 2000; 85: 429-430.