

Anaphylaxis during skin testing with food allergens in children

Constantinos Pitsios · Anastasia Dimitriou ·
Efthalia C. Stefanaki · Kalliopi Kontou-Fili

Received: 29 July 2009 / Accepted: 9 September 2009
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Abstract Skin testing is the diagnostic cornerstone for allergies and is considered extremely safe. It is usually performed with the prick and the prick-to-prick method. The aim of this study is to report the first two pediatric cases of systemic allergic reactions during skin prick tests (SPT) with commercial food allergens. Both patients had a history of fish allergy. A 5-year-old girl, with a history of atopic dermatitis and asthma, reported an episode of urticaria and angioedema due to ingestion of fish, which had occurred 2 years before consultation. Ten minutes after having completed SPT to fish extracts, which had resulted positive, she suffered from generalized pruritus, nausea, stomach pain, and loss of consciousness. A 9-year-old boy, with a history of asthma and two episodes of acute urticaria and angioedema upon eating fish during infancy, reported a recent episode of oropharyngeal pruritus after tasting salmon. He was evaluated for fish allergy with SPT but developed conjunctivitis and acute urticaria during the first

10 min of the test. Anaphylaxis appears to be a rare side effect of skin testing in pediatric patients. Children with a history of asthma and atopic dermatitis are more likely to react.

Keywords Food allergy · Anaphylaxis · Skin testing · Skin prick test · Allergy test

Introduction

Skin prick testing (SPT) is considered a safe, efficient, and rapid method that may confirm or rule-out the diagnosis of IgE-mediated food allergy [1, 5]. Commercial food extracts are commonly used, while the “prick-to-prick” (P-P) method is performed when extracts of specific food items are not available or differences in the allergenicity of different subspecies exist [3, 14]. Intradermal skin tests with food extracts are not used anymore due to increased risk of an anaphylactic reaction and low specificity [3, 15].

Allergic reactions during skin testing are very rare and, in most patients, occur after P-P testing. Anaphylaxis during the performance of SPT with commercial food extracts has only been reported once, in an adult [13], while a few cases of allergic reactions to SPT with airborne allergens (with or without food allergens) have also been published [2, 8–10, 12, 18]. Anaphylaxis has been described with milk, egg, wheat, or fish P-P testing, during infancy [7, 12]. Fortunately, no deaths due to food allergy testing have been reported since 1984; those reported until then had occurred following intradermal testing [5, 11].

In this paper, the first two pediatric cases of allergic reactions during SPT with commercial fish extracts are reported.

C. Pitsios
Allergy Outpatient Clinic, Social Insurance Institute,
Athens, Greece

A. Dimitriou
Private practice,
Halkida, Greece

E. C. Stefanaki
Private practice,
Ioannina, Greece

K. Kontou-Fili
Allergology Department, Euroclinic Hospital,
Athens, Greece

C. Pitsios (✉)
Ipsilantou 32,
111521 Athens, Greece
e-mail: pitsios@yahoo.com

Case reports

Patient 1

A 5-year-old girl with a history of asthma, atopic dermatitis, perennial rhinoconjunctivitis, and an episode of urticaria and angioedema after eating fish (at the age of three) was referred to the allergologist for re-evaluation of food allergy. Fish, seafood, peanuts, tree-nuts, and soy bean had been eliminated from the patient's diet due to positive serum-specific IgE (sIgE; cod(f_3)=10.2 Ku/L, shrimp(f_{24})=4.5 Ku/L, peanut(f_{13})=3.5 Ku/L, hazelnut(f_{17})=6.1 Ku/L, almond(f_{20})=6.7 Ku/L, and soy(f_{14})=3.5 Ku/L).

A panel of commercial food extracts included salmon, cod, herring, shrimp, crab, lobster, mussel, walnut, hazelnut, almond, peanut, soy bean (HAL Allergy, Haarlem, The Netherlands), and tuna (Allergopharma, Hamburg, Germany). SPT were carried out on the volar surface of the forearm. Negative (50% glycerinated HAS-saline) and positive (histamine dihydrochloride, 10 mg/mL) controls were used. SPT to all four fishes resulted positive (wheals, 5–7 mm), while the remaining tests were negative (histamine's wheal, 4 mm). A positive sIgE test (CAP-FEIA™, Pharmacia Diagnostics, Uppsala, Sweden) to cod was found (f_3 = 8 Ku/L).

About 10 min after the completion of SPT, while playing in the waiting room, the patient started crying, complaining of generalized pruritus, nausea, and intense stomach pain: she subsequently lost consciousness (systolic pressure=40 mmHg, diastolic pressure, and heart rate undetectable). Epinephrine (0.20 mg sc) and intravenous fluids were immediately administered; methylprednisolone and cetirizine (drops) per os were also given as soon as she regained consciousness. She recovered completely in about 10 min. She had shown no sign of discomfort during the test so a vasovagal reaction was excluded. A thorough cardiological exam (clinical examination, ECG, Triplex echo) was performed after a few days and was within normal limits.

Although the in vivo and in vitro tests of seafood and nuts resulted negative or of diminished sensitivity (f_{24} =0, f_{13} =1.5, f_{17} =1, f_{20} =0.4, and f_{14} =0), they have not been reintroduced in her diet, given the elevated danger of anaphylaxis.

Patient 2

A 9-year-old boy with asthma was referred for evaluation of fish allergy. An episode of acute urticaria and labial angioedema had occurred at the age of 18 months, after tasting cod; he had no longer eaten fish until a month earlier, when he tasted salmon and developed oropharyngeal pruritus in less than 5 min. Parents claimed that he

tolerates seafood: crab, squid, and shrimps. In vitro evaluation had preceded the allergist's evaluation and sIgE resulted positive to fish: cod(f_3)=4.99 Ku/L, salmon(f_{41})=5.45 Ku/L, sardine(f_{61})=4 Ku/L, and tuna(f_{40})=0.71 Ku/L.

In vivo evaluation was undertaken with SPT to commercial fish extracts of cod, salmon, sardine, and tuna (Stallergens, France), with positive and negative controls (as described in patient 1), on his upper back. SPT reactions were strongly positive (wheals, 10.5–11 mm; histamine's wheal, 7 mm) to all commercial extracts. During the first 10 min of the test, he presented red eyes with pruritus and broke into urticaria on the entire back. He remained hemodynamically stable, no respiratory symptoms developed, and was treated with cetirizine drops (10 mg) and methylprednisolone tablets (20 mg) per os, while being observed closely; the patient recovered uneventfully.

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 [17]. Results of another study regarding 16,204 patients showed that reactions such as malaise may be noticed during skin testing in 0.04% of the patients, but most of them were characterized as atypical, non-allergic in nature [16]. 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 [4].

In a recent paper, it has been reported that 14 out of 5,908 children presented adverse reactions during the performance of allergy skin testing, among which, seven (0.12%) were generalized allergic reactions after P-P to foods and/or SPT to inhaled allergens [12]. According to a recent study, the systemic reaction rate is 0.4% and 3.5% for SPT and total skin testing (including intradermal tests), respectively [2].

A 6.5% rate of allergic reactions due to P-P testing has been reported among 92 babies, less than 6 months of age, tested for food allergy [7]. According to the findings of the same study, involving a total of 1,152 patients, no reactions were reported in children older than 6 months. Infancy, the presence of atopic dermatitis, and performance of duplicate tests are considered risk factors for anaphylaxis during skin testing.

In addition to the aforementioned cases, five more systemic reactions during skin testing to foods have been observed among our patients [14]; four anaphylactic episodes in adults during P-P to various fishes, meats, kiwi, and sour cherry, respectively, and a systemic reaction

(intense stomach pain, sweating, emesis, severe hypotension, and loss of consciousness) in a child during P-P to squid.

The performance of multiple tests of cross-reactive foods in our patients may have increased the absorbed allergen load, but it is common practice to perform all SPT together. Awareness of cross-sensitization patterns is required when an increased number of tests is indicated; in such a case, the performance of ST in more than one sessions is highly recommended. Duplicate tests should be avoided in children with eczema [6], and lastly, pediatric patients should be closely monitored [13, 19].

In conclusion, the rare occurrence of an allergic reaction during skin testing dictates the need for continuous patient observation; physicians should not perform skin tests without the necessary emergency equipment and medications; they should also avoid testing infants suffering from eczema and asthma with native foods [3, 19].

Acknowledgment The authors wish to express their gratitude to the Asst. Professor of Pediatrics Scott H. Sicherer, MD, for his helpful comments on a draft of this paper. We also wish to thank the pediatrician E. Dimitriou, MD, PhD and the cardiologist D. Georgakopoulos, MD, for their medical assistance.

Conflict of interest No sponsorship or other financial relationship with any organization exists.

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