

Skin testing with natural foods in patients suspected of having food allergies: Is it a necessity?

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OAS Oral allergy syndrome

PST Skin prick test

The evaluation of patients suspected of having food allergies includes a detailed history, physical examination, the detection of IgE antibodies directed against the suspected allergen, food challenges if indicated, and education about prevention and treatment of anaphylactic reactions. In patients with food anaphylaxis, proper identification of the allergen responsible for the anaphylaxis is crucial to prevent life-threatening reactions. The hallmark procedure for detecting IgE antibodies against food allergens has been the prick skin test (PST) with commercially prepared allergens. In this article we describe 22 patients from two large pediatric and adult allergy practices who have a clinical history of anaphylaxis to foods with negative PST responses to commercial food extracts but positive PST responses to natural food extracts used for skin testing. In this article we will use the term anaphylaxis to describe a systemic IgE-mediated allergic reaction with subsequent involvement of all or some of the following organ systems: the skin, respiratory tract, cardiovascular system, and gastrointestinal system.

Methods

Subjects

Twenty-two patients, ranging in age from 2 to 47 years, were identified as having food hypersensitivities. Eight of the patients (36%) had allergic manifestations consistent with the oral allergy syndrome (OAS) as described by Ortolani et al.¹ None of the patients' reactions required hospitalization, although some patients went to the emergency room for treatment (patients 6, 7, and 14). All of the patients' reactions were uniphasic anaphylaxis with no obvious biphasic or protracted reactions.

Procedure

Commercial food PSTs refer to skin testing with allergenic extracts purchased from well established extract companies. Natural food PSTs involve performing skin tests with the natural food, which is suspected of causing the reaction. We chose to perform the natural food PSTs on patients who unexpectedly had negative responses to commercial food PSTs in the face of convincing histories of food hypersensitivities not attributable to other possibilities (e.g., idiopathic anaphylaxis or hypersensitivity to other foods).

Skin testing with the natural food involves preparing a crude extract by combining a small sample of the food with saline solution and then performing a PST in a manner similar to that used in commercial extract testing. Some PSTs were performed by embedding the needle in the natural food (prick plus prick) and then pricking the patient. This natural food test was performed only after the commercial food skin test result was negative on two repeat tests. All PSTs were performed on the forearm or back with histamine as a positive control and saline solution as a negative control. All patients had a positive response to histamine and a negative response to the saline control. The commercial food extracts that we used in this study came from many lots over a period of about 2 years. Parents, doctors, and nurses acted as negative control subjects. Patient profiles can be seen in ■Table I.

TABLE I. Characteristics of patients with food allergy and negative commercial food skin test results and positive natural food skin test results

Patient No.	Sex	Age (yr)	Type of atopy	Symptoms after food ingestion	Food*
1	F	23	A, AR	Itchy throat, generalized urticaria, swollen tongue	Shrimp
2	M	19	A, AR, AD	Generalized urticaria	Peanut
3	F	15	A, AR, AC	Itchy throat, swollen tongue, facial urticaria	Plum
4	M	8	A, AR, AC, AD	Generalized urticaria, wheezing, laryngeal edema	Egg
5	M	2	Only FA	Angioedema of face and facial urticaria, sore throat	Tuna
6	M	8	A	Wheezing, generalized urticaria	Peanut
7	M	5	A, AR, AC, AD	Generalized urticaria, facial angioedema, cough, wheezing	Peanut, walnut
8	F	40	AR, AC	Itchy throat, swollen lips	Apple
9	M	18	A, AR	Itchy throat, swollen lips	Apple
10	M	4	A, AR, AC, AD	Urticaria around mouth, swollen lips	Peanut
11	F	47	Only FA	Generalized urticaria, wheezing, laryngeal edema	Shrimp
12	M	16	A, AR	Generalized urticaria	Milk

13	F	16	A, AR	Generalized urticaria, itchy throat, shortness of breath	Walnut
14	M	5	A, AR, AC	Wheezing, coughing	Peanut
15	F	24	AR, A, AC	Generalized urticaria, itchy throat and eyes	Peach, apple, potato
16	F	2	Only FA	Facial urticaria, cough	Peanut
17	M†	7	A, AR	Swollen lip and tongue, facial urticaria	Walnut
18	M	16	A, AR	Abdominal cramps, vomiting	Scallop
19	M	27	AD	Itchy mouth, chemosis, abdominal cramps	Shrimp
20	F	20	A, AR	Itchy mouth, nasal congestion	Brazil nuts
21	F‡	40	A, DH	Urticaria on hands with contact	Shrimp
22	M	10	A, AR	Itchy throat, swollen tongue	Tuna

A, Asthma; AR, allergic rhinitis; AD, atopic dermatitis; AC, allergic conjunctivitis; FA, food allergy; DH, drug hypersensitivity.

*The food that showed negative commercial PST results but positive natural PST results.

†This patient did not ingest the walnut but was playing with it and rubbed it up against his lower lip.

‡This patient did not ingest the shrimp, but extensive urticaria developed on her hands when she peeled shrimp. Skin test results were positive to both cooked and raw shrimp.

Results

All of the patients demonstrated negative responses to PSTs with the commercial food extracts but positive responses to PSTs with the natural food extracts. The commercial extracts used in this study have produced positive results in many patients, showing that in the vast majority of our patients with food allergies, the commercial extracts did elicit a positive skin test result.

Discussion

The use of natural foods for PSTs as a substitute for commercial food extracts has been previously discussed in some detail, primarily in patients with the OAS.¹ These patients, for the most part, have symptoms in the oropharynx with oral itching and lip angioedema. Rarely, other systemic manifestations of anaphylaxis may be present as well. Skin testing in these patients often shows negative responses to PSTs with commercial food extracts but positive responses to PSTs when natural food extracts are used.¹ Interestingly, the foods incriminated in the OAS are fruits and vegetables. Our present investigation was enlightening for two reasons. First, 14 (64%) of our patients with negative PST responses to commercial food extracts and positive PST responses with natural food extracts did not have the OAS but rather significant anaphylaxis. Second, the foods incriminated and presumed to be the allergen in question were not limited solely to fruits and vegetables, as in the OAS, but included fish, crustaceans, mollusks, egg, and milk (Table I). Because no double-blind placebo-controlled food challenge was performed with any of the foods that showed a negative commercial PST result and a positive natural food PST result, it is possible that these foods were not the ones that caused the anaphylaxis. We certainly found these results to be quite unexpected, especially in regard to peanut. We recognize that the peanut results are not consistent with the data presently found in the literature, but unfortunately, we are at a loss to fully explain these observations. The peanut skin testing data comes from the Hartford group, which involves three offices with different lots of extracts used over a 2-year period.

A possible explanation as to why the PST results with commercial food extracts were negative in our patients when the PST results with the natural food extracts were positive appears to be in some part related to the stability of the allergen. It is possible, and most likely probable, that during the manufacture of the extracts, certain specific allergens are lost. It is well known that cooking foods may in some cases (e.g., fruit) destroy

certain allergens, whereas in other foods (e.g., shrimp) cooking apparently does not destroy all of the allergens. One of our patients (patient 1) had a very interesting skin test result with shrimp. The patient brought in raw and cooked (steamed) shrimp for natural food skin testing. The PST result with the raw shrimp was negative, whereas the PST result with the cooked shrimp was unequivocally positive. This was repeated twice on the patient with the same results. It appears that cooking the shrimp did not destroy all of the allergens but rather produced new ones not present in the raw shrimp, possibly by altering existing allergenic proteins or by exposing allergenic epitopes already present in the shrimp (conversation with Carolyn Beach Daul, November 1992).

Although it is generally well accepted in the allergy community that a negative PST result with commercial extracts virtually rules out IgE-mediated food hypersensitivity,² we strongly recommend that if the history is convincing and commercial food PST results are negative, patients should be skin tested with the natural food before they consume it. We also suggest that the patients be tested with the food in the form that caused the reaction (e.g., raw or cooked shrimp). Although these patients represent a small percentage of our patients with food hypersensitivity, had we not pursued prick skin testing with the natural food, they may not have had proper identification of the allergen responsible for their anaphylaxis, which could have disastrous consequences. With the recent report by Sampson et al.³ regarding food anaphylaxis in children, we feel compelled to present this data with the hope that it may stimulate other physicians to more thoroughly evaluate their patients with negative commercial food PST results and positive histories.

References

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