Anaphylaxis to raw potato

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Background: Potato allergy has been described rarely, generally in relation to the Oral Allergy Syndrome (OAS). Adults with seasonal allergic rhinitis have been reported in whom peeling of raw potatoes causes oculonasal symptoms, wheezing, and contact urticaria. Skin testing with fresh fruits and vegetables has been recommended in cases of OAS, although the sensitivity of commercial potato extract is reportedly equal to that of fresh potato.

Case Report: This report describes a 4-year-old with raw potato-induced anaphylaxis. He rapidly developed urticaria, angioedema, respiratory distress, vomiting and diarrhea after biting into a raw potato that was being used for painting in preschool. Review of systems is significant for viral-induced wheezing, but no symptoms suggestive of seasonal allergic rhinitis were evident. His mother has a history of seasonal allergic rhinitis and contact urticaria with raw potato. Skin testing to commercial potato extract was negative and skin testing to fresh potato by the prick + prick method was markedly positive. Skin testing to birch tree was negative. An open challenge to a small amount of cooked potato was negative. Food challenge to raw potato was not considered indicated in this case of immediate anaphylaxis to a single food.

Conclusions: This patient had clinical and skin test reactivity to raw and uncooked potato in the absence of OAS. The patient will be followed for the development of seasonal allergic rhinitis.

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INTRODUCTION

Reactions to both cooked and raw potato have been described sporadically in the literature. Reactions to raw foods can elicit a variety of symptoms ranging from oral pruritus to systemic reactions. Patients with oral allergy syndrome (OAS) have oral itching and angioedema after eating fresh fruits and vegetables and can usually tolerate the same foods cooked or stored. Rarely, patients may also have systemic symptoms including rhinoconjunctivitis, urticaria-angioedema, asthma, and anaphylaxis.[1] Patients with OAS typically have seasonal allergic rhinitis, and it is thought that allergens present in the pollens cross-react with labile proteins in fresh fruits and vegetables.[2] Typically, patients with birch tree allergy react to apple, carrot, potato, celery, and/or hazelnut. Similarly, celery OAS is associated with mugwort allergy, and melon and banana OAS is associated with ragweed.[1]

CASE REPORT

We report a 4-year-old with no previous history of seasonal allergic rhinitis in whom raw potato precipitated anaphylaxis.

N.M. is a 4-year-old who developed urticaria, angioedema, nasal congestion, wheezing, vomiting, and profuse diarrhea immediately after biting into a raw potato being used for a painting project at preschool. The symptoms responded to diphenhydramine. He previously developed urticaria when helping his mother cut up raw potatoes. He disliked other forms of cooked potatoes.

Review of symptoms revealed daily nocturnal coughing, wheezing with upper respiratory infections, recurrent rhinorrhea, and mild atopic dermatitis. There is no seasonal variation to his symptoms. Environmental history reveals two pet cats in his grandmother's home.

Past medical history is significant for gastroesophageal reflux until age 18 months. He developed urticaria after eating eggs as an infant, and now tolerates whole eggs without any adverse effect. He has no known drug allergies.

Family history is significant for a mother with allergic rhinitis and anaphylaxis to raw bell pepper. The father has a history of seasonal allergic rhinitis and allergy to black walnut and banana.

On physical examination, HEENT examination was significant for pale blue edematous nasal mucosa. His tympanic membranes were normal. His oropharynx revealed cobblestoning. His neck was supple without lymphadenopathy. His heart had a regular rate and rhythm. His chest was clear to auscultation. His abdominal examination was benign. His extremities were normal. His skin examination revealed excoriated papules on the buttocks, and dry erythematous patches on the face.

MATERIALS AND METHODS

Prick skin testing to commercial extract (Greer Laboratories, Inc., Lenoir, NC) was performed on the forearm with a bifurcated needle (Allergy Labs of Ohio, Inc., Columbus, OH) by pricking through a drop of the extract, which was then absorbed. Prick skin testing was done to the raw potato by a prick + prick technique described by Dreborg and Foucard[3] with raw potato and a bifurcated needle. Reactions were recorded in millimeters of the largest diameter of the wheal and flare. A wheal of 3 mm greater than the negative control was considered positive.

RESULTS

Prick skin test results are reported in Table 1. The patient had a negative reaction to commercial potato extract,

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Table 1. Results of prick skin testing

Allergen	Wheal (mm)	Flare (mm)	Result
Negative control	0	0	Negative
Histamine	5	30	Positive
Potato extract	0	0	Negative
Raw potato	10 (pseudopods)	40	Positive
Birch	0	0	Negative
Timothy grass	0	0	Negative
Alternaria	0	0	Positive
Dust mite*	4	10	Positive
Cat	4	20	Positive
Raw carrot	0	0	Negative
Raw apple	0	0	Negative
Raw celery	0	0	Negative

* *Dermatophagoides farinae.*

birch, and timothy grass and a positive reaction to raw potato.

An open challenge was done to cooked potato. The patient tolerated a single french fry but refused additional french fries.

DISCUSSION

We report a 4-year-old boy with perennial allergic rhinitis, asthma, and atopic dermatitis who developed a systemic reaction to raw potato. There was no evidence of pollen sensitivity by history or prick skin testing. Small quantities of cooked potatoes were tolerated.

Reactions to potatoes vary. Ortolani et al[1] described asthma symptoms to raw potato in two adults with OAS. In their study of 100 patients aged 10 to 61, 8 had adverse reactions to potato. Of those two whose symptoms were reported, both were 33 years old and had asthma symptoms within 5 minutes of an oral challenge.[1] Several authors have reported females in whom peeling of raw potatoes precipitated various reactions including rhinoconjunctivitis, wheezing, contact urticaria and flares of atopic dermatitis.[4,5] Castells et al[6] described an 11-year-old girl with a history of anaphylaxis to cooked potato at 5 months of age who subsequently developed urticaria, angioedema, and respiratory and systemic symptoms on contact, ingestion, and exposure to cooking potatoes and potato pollen. Delgado et al [7]reported a 4-year-old boy with a history of perennial rhinitis who developed contact urticaria to raw potato pulp. He tolerated ingestion and contact with cooked potatoes.

The allergens in OAS are unstable. Prick skin testing with commercial food extract may be negative in patients with OAS, because preparation of the extract may alter the allergens present in these foods. Skin testing with the fresh food may then show a positive reaction. In testing patients with OAS, the fresh food skin prick tests are generally more sensitive than the commercial extracts. However, the sensitivity varies widely, as Ortolani reported potato extract having sensitivity equal to that of the commercial extract (87%). With other foods such as pear, the commercial extract has a sensitivity of 0% in OAS.[1] In our patient the fresh food skin test was more sensitive than the commercial extract, in contrast to Ortolani's findings in adults.[1] Other case reports have also supported our findings.[7,8]

The allergens in potato appear to be heat-labile.[4] Several allergens may be present in raw potato.[9] Seppala et al[10]have recently described patatin, a novel allergen for children with positive skin test to raw potato.

The two studies investigating sera of children with potato allergy involved only children with reactions to cooked potato. Wahl investigated the sera of 12 children aged 1 to 16 years with IgE-mediated hypersensitivity reactions to potato. They concluded that raw potato extract contained several allergens not present in potato starch or flour. Their patients all had allergic reactions to boiled potatoes. These patients were not skin tested. Of those 27 patients reported by Seppala[10], only seven had histories suggestive of adverse reactions from cooked potatoes, such as exacerbation of atopic dermatitis or lip swelling. These patients had other food allergies, and skin testing to raw potato was performed as part of a routine screen. The patients did not undergo food challenges, so the clinical relevance of their findings is unclear.

Our patient does not exhibit pollen sensitization, although he is clearly atopic. He therefore does not meet criteria for OAS. However, he is more sensitive to raw potato than cooked potato. Whereas the amount of cooked potato given during the open challenge was small, he had not actually ingested the raw potato that precipitated anaphylaxis. Although our patient did not undergo a food challenge to raw potato, there is little doubt that his episode of anaphylaxis is because of raw potato. In cases of immediate anaphylaxis to a single food, the history is considered reliable and food challenge is not indicated.[11]

If the patient does develop seasonal allergic rhinitis, this may give some insight into the natural history of potato OAS, with the food allergy preceding pollen sensitization. Asero prospectively followed birch pollen-sensitive patients without OAS and some were noted to later develop symptoms on exposure to Apiaceae (carrot, celery, and fennel), apple, and hazelnut, suggesting that birch pollen allergy precedes Apiaceae, apple, and hazelnut OAS.[12]

Although exposure to raw potato is usually limited to food preparation and has been described as an occupational allergy[13] for housewives, potato painting commonly done in preschool and daycare centers represents a previously undescribed exposure in the pediatric age group.

CONCLUSION

We describe a young child with anaphylaxis to oral exposure of raw potato who tolerated a small amount of cooked potato. This case is unique in that this occurred in the absence of oral allergy syndrome. Skin testing to fresh fruits and vegetables should be considered even in patients without a history of oral allergy syndrome.

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