

Case Report

ALLERGY TO APPLE SEEDS IN A PEANUT-ALLERGIC CHILD

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INTRODUCTION

Allergic reactions to fruits are commonly described, resulting most frequently in symptoms of the oral allergy syndrome (pollen fruit syndrome), and less often in more severe reactions and anaphylaxis. The flesh or pulp of the fruit is most commonly the cause of such reactions. Less commonly described are allergic reactions to the seeds ('pips') of fruits, reported in only a handful of case reports, but probably under-recognised. This case report describes a young boy, with a known allergy to peanuts, who experiences an allergic reaction when biting into seeds of both apples and watermelons, but is tolerant of the fruit pulp. It is one of very few cases in the literature that describe an allergy to a non-citrus fruit seed.

CASE

An eight-year-old boy, TO, attending the Red Cross Children's Hospital Allergy Clinic, had a history of an acute reaction to peanut (immediate-onset facial hives after consumption of a trace amount of peanut) at the age of two years. He had avoided peanuts as well as all tree nuts from that time onwards. He tolerated legumes and sesame seed. More recently, he had accidentally ingested a piece of cake containing nuts (he was not sure of which nuts exactly), resulting in an itchy mouth and hives on the neck. There was no respiratory distress on either occasion of a reaction and he responded well to oral antihistamines. He had signs of allergic rhinitis (and had previously been found to be sensitised to house dust mite and grass) but no asthma. Incidentally, he had a rare genetic bone dysplasia, sclerosteosis, which had caused skeletal overgrowth in the facial nerve canals, leading to bilateral facial nerve palsies requiring surgical decompression.

During one of the consultations, his mother mentioned that, on several occasions, he had reacted with facial urticaria after biting into apple seeds. He definitely did not react to the pulp/flesh of the apple, and continued to eat apples though carefully avoiding the pips. The same reaction occurred with watermelon seed but not the flesh. The results of the investigations are shown in Table I.

A diagnosis of ongoing peanut allergy was made, as well as allergy to apple seed (but not pulp) and probably watermelon seed (though watermelon was not tested as

TABLE I		
FOOD	SKIN-PRICK TEST RESULT	SPECIFIC IgE RESULT
Peanut	10 mm	3.91 kU/ℓ (Ara h 2 0.40 kU/ℓ)
Almond	Not performed	0.92 kU/ℓ
Brazil nut	Not performed	0.34 kU/ℓ
Hazelnut	Not performed	1.73 kU/ℓ
Apple pulp	1 mm (prick to prick test)	
Apple seed	4 mm (prick to prick test)	
Negative control	0 mm	
Positive control (histamine)	3 mm	

it was out of season at the time of testing). A challenge to mixed tree nuts (hazelnut, almond and cashew nut) was performed and passed.

DISCUSSION

Seeds come in a wide variety of forms, including those which are commonly added to foods (such as sesame or sunflower seeds), the seeds within fruits and vegetables, and other foods less commonly thought of as seeds such as the coffee bean and coconut! This case describes the unusual situation of a reaction to a fruit seed but not the pulp.

The majority of the case reports on fruit-seed allergy describe a citrus-seed allergy in patients with a concomitant nut allergy, most commonly cashew nut but in some cases peanut. The Rutaceae family (e.g. lemon, tangerine, orange) is botanically closely related to the Anacardiaceae family to which cashew belongs, both belonging to the Sapindales order.¹ This goes some way in explaining the frequently observed co-reactivity. In some cases it appears that the fruit seeds need to be cut or crushed before causing symptoms.

PREVIOUS CASE REPORTS ON FRUIT-SEED ALLERGY

Brandstrom et al described a case series of four children with known cashew nut allergy, who reacted to citrus seeds in the form of lemon juice, lemon seeds, tangerine seeds

and lemon dressing, respectively.² One of these patients had an anaphylactic reaction. 11S globulin, 7S globulin and 2S albumin storage proteins were isolated from lemon seeds and described as allergens for the first time. The serologic cross-reactions between homologous proteins from cashew and citrus seeds were established.

A further case report described a patient with co-reactivity to peanut and citrus seed, who had an anaphylactic reaction to lemon soap.³ Immunoblotting demonstrated complete IgE cross-reactivity among different citrus seed extracts, and partial cross-reactivity between the peanut and orange seed extracts.

A further case report described a six-year-old boy with cashew allergy who chewed and swallowed the seeds while eating a mandarin.⁴ He developed a systemic reaction within one hour of ingestion, including periorbital oedema, widespread pruritus, abdominal pain and nausea. The SPT result was positive to mandarin seed and cashew but negative to mandarin juice.

Turner et al described two cases of citrus-seed allergy in children with a known peanut allergy, and also with sensitisation to cashew and pistachio nut.⁵ A six-year-old girl experienced a generalised non-anaphylactic reaction to an unknown constituent of a fruit salad and had a positive skin-prick test (SPT) response to orange seed but negative to orange pulp. At a formal in-hospital open food challenge (OFC), she had anaphylaxis (abdominal pain, urticaria, and shortness of breath with oxygen desaturation) after ingestion of a single orange seed. The second child, a five-year-old girl, had anaphylaxis after ingestion of a cut slice of orange but had a negative SPT response to orange pulp and tolerated a full seedless orange at a subsequent OFC. The SPT response was positive to fresh orange seed and mandarin and grapefruit seeds, and she was therefore given a diagnosis of citrus-seed allergy.

Turner also described what appeared to be the first reported case of a reaction to a non-citrus seed.⁵ The case was of a 15-month-old child, known to be sensitised to peanut, who presented with anaphylaxis on first exposure to commercially produced apple and oatmeal baby food (containing apple puree, apple juice, oats and cinnamon extract). Within minutes of ingesting two teaspoons, he vomited, became lethargic and had cyanosis with drooling, requiring multiple doses of intramuscular adrenaline. He had previously tolerated home-made apple puree and oats. SPT responses were positive to the ingested baby food (5 mm), apple seed (4 mm), and orange seed (4 mm) and negative to fresh apple, cinnamon and oats. The manufacturer confirmed that the baby food implicated was produced in a factory which did not handle other potential allergens, including nuts, but that apples were not routinely

cored during production of apple puree, hence the puree was likely contaminated with crushed apple seed.

A more recent case report by Murad et al described the case of a child who developed two separate episodes of anaphylaxis after eating apple seed (found in apple puree made with whole apples) and grapes, respectively.⁶ Evidence from analysis of an ISAC 112 test (Immuno Solid-phase Allergen Chip test, Phadia) suggested that non-specific Lipid Transfer Proteins (LTPs) may have been responsible for these reactions.

CLINICAL IMPLICATIONS OF FRUIT-SEED ALLERGY

Allergy to fruit seeds is probably under-recognised and should be considered in the work up of fruit allergy, especially if the flesh of the fruit has been previously tolerated. Clinicians should be aware of the possible association between allergy to fruit seeds and nuts, particularly to peanut, cashew and pistachio nut. Fruit seeds should be considered as a potential cause of unexplained anaphylaxis in patients with nut allergy.

The prevalence of co-sensitisation between nuts and fruit seeds and the identification of cross-reactive allergens have both not been fully elucidated, and require further research. However, it seems reasonable to counsel nut-allergic patients to avoid chewing fruit seeds (especially citrus seeds in cashew-allergic patients) and to take care with freshly squeezed juices which may contain crushed seeds.

Certainly the clinician should consider fruit seeds as a possible cause of severe allergic reactions to fruits.

This article has been peer reviewed.

DECLARATION OF CONFLICT OF INTEREST

The authors declare no conflict of interests in relation to this publication.

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