

Allergic Reaction to Inadvertent Peanut Contact in a Child

Arnaldo Cantani, M.D., Ph.D.

ABSTRACT

Peanut anaphylaxis is a potentially near-fatal or fatal disease complicated by the fact that peanuts as well as other food items are commonly used as an adulterant in the preparation of foods. A boy is reported with peanut allergy to demonstrate, presumably for the first time, that contact urticaria occasionally provoked by peanuts can be associated with IgE-mediated allergy. Methods included skin prick tests, specific IgE determination, and open food challenge. All data were positive for an IgE-mediated allergy, and the open challenge with peanut resulted in systemic reactions. Food allergy is a common ailment in childhood. Although the ideal treatment is elimination of the offending allergen hidden, accidental, or unusual exposures can cause unwanted reactions, and anaphylaxis. The most reliable treatment appears to be prevention. (Allergy and Asthma Proc 18:323–326, 1997)

Immediate contact reactions of the skin, including contact urticaria, are a heterogeneous group of inflammatory reactions that appear within minutes to an hour after contact with the triggering substance and disappear within a few hours.¹ More than 200 substances have been reported to cause contact urticaria,¹ and new ones are being found continuously.² Contact urticaria is a wheal and flare response to rapidly absorbable agents to intact skin, that occurs in about 50% of children with atopic dermatitis (AD) and food allergy (FA).³

When parents report that their children develop immediate reactions around and in the mouth or on their hands shortly after consuming cow's milk (CM) or egg and sometimes other foods, it is rather convincing that it is contact urticaria.⁴ Onset may be acute, such as urticaria (and shock) to peach in a baby of 4 months, to wheat flour and egg at

5–6 months, or delayed such as worsening of AD lesions in ^{34/40} 0–5-year old children.⁵

The immune mechanism associated with these reactions is the classic IgE-mediated reaction, type I, according to the four basic types of hypersensitivity reactions.⁶ In particular, anaphylaxis or immediate hypersensitivity is usually provoked by small quantities of allergens, at the point that a minuscule offending quantity can trigger a reaction by skin contact or by ingestion or even by inhalation.⁷

Peanuts are a major factor in life-threatening anaphylactic reactions since they can be hidden in various foods. In a review of fatalities from food-induced anaphylaxis, ⁴/₅ cases were due to peanut, four of which were children aged 11–19 years.⁸ Another report documented that peanuts were responsible for ³/₅ of the fatal and ⁴/₇ of near-fatal food-induced anaphylactic reactions in children aged 2–17 years.⁹ It is often impossible to detect peanuts in Oriental dishes to which they are often added as flavor enhancers. In addition, deflavored or reflavored peanuts may be used as substitutes for walnuts, pecans, or almonds in cakes or confections.⁸ Three young adults and a 15-year-old boy, all aware of being peanut-allergic, were the victims of four near-fatal and fatal reactions after inadvertent ingestion of meals containing peanuts.¹⁰ Another severe reaction occurred eating a vegetableburger including peanuts that was mistaken for a beefburger.¹¹ Several deaths ascribed to FA were associated with unsuspected exposure to offending foods in restaurants or at parties.⁸ The following case highlights this aspect.

CASE REPORT

A 9-year-old boy was referred to the Division of Allergy and Immunology, Pediatric Department, University of Roma "La Sapienza" for allergy evaluation.

The family history was positive since his father suffered from rhinoconjunctivitis, and a younger sister from AD and FA. The boy had AD and CM allergy; however he achieved tolerance for both allergies at the age of 3–4 years. Subsequently he developed allergy to inhalants (*Dermatoph-*

From the Division of Allergy and Immunology, Department of Pediatrics, University of Roma La Sapienza, Rome, Italy
Address correspondence and reprint requests to Dr. Arnaldo Cantani, Via Baglivi 7, 00161 Rome, Italy

goides pteronyssinus = Der p) well controlled with specific immunotherapy (SIT).

The family was concerned with possible allergies to chocolate and peanuts. The boy had almost never consumed these food items; however, he recently developed contact urticaria when caressed and kissed by an aunt while she was eating peanuts. This occurred only once. The parents declared that they very rarely consumed peanuts.

INFORMED CONSENT

The parents gave their consent to the following procedures and signed a separate informed consent document. Physical examination was unremarkable, except for slight wheezing.

METHODS

Skin testing was done by the prick method (SPT) on the volar surface of the forearm. The child was tested with histamine $1/1000$ as a positive control and isotonic saline as a negative control,¹² whole CM protein, casein, lactalbumin, egg, fish, peanut, chocolate, legumes, Der p, and *Alternaria alternata* (Bayrofarm, Milano, Italy). They were placed on the volar surface of the forearm as drops through which the skin was superficially abraded with a straight pin. A new pin was used for each SPT. The SPT was read at 20 minutes and considered positive as follows:

- + when the wheal was $1/4$ of the histamine wheal;
- ++ when the wheal was half of the histamine wheal;
- +++ when the wheal was equal to the histamine wheal;
- ++++ when the wheal was two-fold the histamine wheal.¹³

The determination of specific IgE levels was done by radioallergosorbent test (Phadezym RAST, Pharmacia Diagnostics). RAST results are expressed in RAST Units (PRU = Phadebas RAST Unit) as follows:

- 1st class = IgE levels < 0.35 IU/mL,
- 2nd class = IgE levels between 0.35 IU/mL and 0.7 IU/mL,
- 3rd class = IgE levels between 0.7 IU/mL and 17 IU/mL,
- 4th class = IgE levels higher than 17 IU/mL.

RESULTS

The child tested positive for Dpt (3 +), peanut (3 +), and chocolate (2 +). The specific IgE was positive for Dpt (3rd class), peanut, and chocolate (2nd class). Three months later the boy underwent an open challenge test for peanut and chocolate, another legume.

CHALLENGE PROCEDURE

Before the test, parents were instructed to eliminate peanuts and all peanut-containing products for 2 weeks, and to withdraw antihistamines for 7 days (according to

half-life) before the provocation test. The challenge was performed orally in the hospital under medical observation and with emergency equipment at hand to treat anaphylaxis, using a standard scoring system. At the end of the 2-week period, a clinical examination of the child was performed to exclude present diseases or other issues that could contrast with the correctness of the procedure.

Peanut was administered in the fasting state following our procedure:¹⁴ due to the testing results 1 mg of minced peanut was put on the inner border of the lower lip and then swallowed. A further 2 mg of peanut was given by mouth after 5 minutes, and after 20 minutes 4 mg was given.

Within minutes the boy manifested mucosal pruritus, then lip edema, urticaria, and bronchospasm that required subcutaneous epinephrine 1:1000 and parenteral diphenhydramine.

He recovered quickly and remained under observation in hospital the next 4 hours. The parents were instructed to control the son strictly during the following 24 hours, however uneventfully. After a 1-week interval, an open challenge with chocolate was done with the same procedure, with negative results. Repeating the test with peanut and placebo in a double-blind manner (DBPCFC) should have been done unless the reaction to the open challenge was very severe.

DISCUSSION

In their exhaustive list of foods producing immediate contact urticaria, Lahti and Maibach mention only peanut butter.¹ Thus, to my knowledge, this is the first report of contact urticaria provoked by peanut. Peanut is so potent an allergen that some patients have SPT positive at the dilution of 1:10⁷.¹⁵ A woman was so sensitive that SIT to peanut was begun at 1:10⁶.¹⁶ The precaution of starting with a small dose of allergen on the lower lip of the boy is explained by the 7.4–14.8% rate of children experiencing severe reactions within minutes of ingesting a few drops of CM.¹⁷

This case is another example of allergens triggering reactions in an unusual way. Contamination of the foods in the elimination diet by offending foods can cause misleading results. Food can be contaminated easily with suspect foods due to errors during processing, including the inadequate cleaning of equipment or the inadvertent use of certain ingredients. Table I summarizes all the cases in which very small quantities of triggering allergens, heedlessly or inadvertently ingested or inhaled, can provoke significant reactions. Yunginger et al. documented that adverse reactions to sunflower butter in peanut-allergic individuals were due to inadequate cleaning of the equipment for processing of the butter.⁸ In addition I have observed the use of the same utensil for several different foods, and inadvertent exposures to a suspect food while trying to adhere to an elimination diet (Table I).

Many examples exist of the unlabeled uses of food ingredients that could lead to inadvertent exposure to offend-

TABLE I

Small Quantities of Offending Allergens May be Heedlessly or Inadvertently Ingested by Food Allergic Children

Negligible quantities of offending food(s) may "contaminate" other foods due to:
Inadequate cleaning of kitchen utensils, pots, etc.
Clumsy attempts to separate or eliminate an offending food from the others
Direct or indirect contact between two foods, e.g., when one uses the same pots or trays to serve different courses
or may unnoticedly reach the sensitive child via:
Touching or licking kitchen utensils, bottles, tableware, glasses, cups, etc., with residues of the offending foods
Inhaling the fumes during cooking or baking of offending food
Unknowingly being in the vicinity of or during servings of offending foods in restaurant, at parties, etc.
Inhaling food allergens from carpeted and smooth floors
Opening wrappings or cans containing the food or inadvertently touching it
Kissing, or being kissed/caressed by persons who have consumed/touched the food
Failure to eliminate specific components of the offending food:
Lactose can be contaminated with CM proteins
Lecithin can be contaminated with egg or soy proteins
Starch can be contaminated with wheat, corn, tapioca proteins
Gluten-free products may contain other wheat proteins
Unlabeled inclusion of the offending food as ingredient:
Errors in processing and preparations
Unlabeled and/or unspecified restaurant foods
Unknown source of food ingredients: lecithin (egg or soy-bean) starch (wheat, corn, tapioca, potatoes, etc.)
Deliberate/accidental feeding
hidden bottle at maternity ward
"Grandmother effect," e.g., egg feeding
Cross reactivity among <i>closely</i> related foods:
Cow, sheep, and goat milk
Chicken, turkey, duck, and goose eggs
Protein hydrolysates and CM proteins

ing foods during elimination diets.⁹ Errors in processing and/or preparation fall into this category.¹¹ Restaurant foods are not always labeled and exposure can easily occur in restaurants or other food service situations.¹⁰ The case limit is a young woman so exquisitely allergic that she had attacks of itching, sneezing, and then anaphylaxis to the odor of peanuts served to other people.¹⁶ The sources of various food ingredients and the presence of offending allergens in these ingredients are frequently unknown.^{9,11}

Traces of peanut oil were found even in infant formulas¹⁸ and in vitamin D oily preparations.¹⁹ Sensitivity to peanut appears early in life and, once established, persists indefinitely. In the study by Bock and Atkins²⁰ none of the 32 patients with peanut allergy followed up to 16 years had outgrown their clinical sensitivity. Despite attempts to avoid peanut products, 75% of patients had accidentally ingested this allergen during the 5 years preceding reevaluation.

This does not mean, however, that children should be placed in a cage, or into a situation whereby they could suffer from a "witch hunt" complex. I only wish to stress that great efforts in the management of FA can be nullified by a simple caress. I add to the unusual cases reported in the literature^{21,22} a boy with a confirmed allergy to peanut who presented with skin and lip redness when caressed and kissed by an aunt who had not yet been informed about his allergy.

In conclusion, I have reported that contact urticaria occasionally provoked by peanuts can be associated with IgE-mediated allergy. Peanut-sensitive patients are at risk of anaphylactic, life-threatening reactions. Although peanut-induced fatal and near-fatal anaphylactic reactions cannot be prevented completely,⁹ their number can be greatly reduced by careful attention to prevention guidelines.²³

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