

RESEARCH LETTERS

Allergy to quail's egg without allergy to chicken's egg. Case report

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ABSTRACT

Introduction: We present a case of quail's egg allergy without allergy to chicken's egg.

Case: Girl of 10.5 years old who presents anaphylactic reaction after she ate an uncooked quail's egg. She had eaten boiled quail's egg before. She eats chicken's eggs without clinical symptoms.

Methods: We made a prick to chicken's egg and prick-by-prick to uncooked quail's and raw chicken's egg. We determined specific IgE to chicken's egg; electrophoresis and IgE by immunoblot to eggs from chicken, duck, goose, and quail.

Results: We obtained negative results to prick, prick-by-prick and specific IgE to chicken's egg. Prick-by-prick to quail's egg was positive. By immunoblot we recognised a protein in quail's egg white, which is ovotransferrin without any similar bands in other species' eggs.

Conclusions: The protein that we recognised is a specific protein of quail's egg. These proteins did not cross-react with proteins of chicken's egg. Cooking may degrade such proteins.

Key words: Allergy. Chicken. Children. Egg. Food. Quail. Electrophoresis. Immunoblot.

INTRODUCTION

Eggs are one of the most traditional foods in the human diet worldwide. The most common one is chicken's egg, although we may consume other birds' eggs such as duck's, those of geese, quails, and seagulls. Chicken's egg is the most frequent cause of food allergy in Spanish children¹ followed by cow's milk and peanuts, as occurs in other countries.

In the present article, we present an unusual case of food allergy after ingestion of quail's egg in a paediatric patient who was not allergic to chicken's egg.

CASE

Our patient is a ten and a half year-old girl who in the previous month presented deglutition difficulty, facial oedema without dysphonia or rash, two minutes after ingestion of a uncooked quail's egg. The family did not refer similar episodes after ingestion of quail's meat nor chicken's egg (fresh or boiled). She had not previously ingested uncooked quail's eggs, although she had had them boiled.

She had never had allergic reactions to other foods, nor did she have a history of asthma.

METHODS

Prick test

The cutaneous trials by prick test were performed with commercial extracts according to Aas and Belin

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method, of common inhaled allergens such as mites, animal epithelium, fungal (IPI [International Pharmaceutical Immunology], Spain), pollens (ALK-Abello, Spain), in a 0.5 % phenolated solution and 50 % glycerine. We performed prick test to latex (10 mg/ml, Bial-Aristegui, Spain), and chicken's eggs proteins: white 1 mg/ml, yolk 1 mg/ml, ovalbumin (OVA) 10 mg/ml, y ovomucoid (OVM) 10 mg/ml (ALK-Abello, Madrid, Spain) in a 0.4 % phenolated solution and 50 % glycerine.

As a positive control histamine diclorhidrate at 10 mg/ml concentration in a 0.5 % phenolated solution and 50 % glycerine was used. As a negative control, 0.5 % phenolated solution and 50 % glycerine was used.

The prick test results were evaluated after fifteen minutes and were considered positive if the diameter of the wheal was at least three millimetres.

We performed prick-by-prick test with fresh yolk and white quail's egg (*Gallinacea, Coturnix coturnix*) and raw chicken's egg (*Gallinacea, Gallus domesticus*) following Dreborg and Foucard's method, being considered as positive if after fifteen minutes the diameter of the wheal was at least five millimetres.

Serum IgE determination

Enzyme-immunoassay using Pharmacia CAP System_ uniCAP® (Pharmacia Diagnostics, Uppsala, Sweden) following the manufacturer's instructions determined total and specific IgE.

Specific IgE levels were measured for latex, chicken's egg proteins.

Extracts

The white from the chicken, quail, duck and goose eggs were extracted by magnetic centrifugation at 10 % weight/volume in PBS (Phosphate-Buffered Saline) during ninety minutes at 6 °C. After the centrifugation, the floating supernatants were filtered through a 22-µm filter and stored at -20 °C until they were processed.

SDS-PAGE and immunoblot IgE

The SDS-PAGE was performed using Laemmli's method, using non-reduction conditions and a 15 % polyacrylamide gel. The white of the egg proteins extracted was obtained with SDS-PAGE and transferred to nitrocellulose membranes as Towbin et al. described.

The immunoblot assay for the patient's IgE linked proteins was made using chemoluminescence according to the instructions provided by the manufacturer (ECL Amersham). As negative controls, we performed blots using a phosphate tamponated solution instead of the patient serum.

RESULTS

Prick tests were all negative, including usual pneumoallergens: cereals; milk; chicken's egg; meat; fish; seafood; fruits; nuts; vegetables; legumes; *Anisakis*; and latex.

Prick-by-prick test with fresh materials was negative to the yolk and the white of chicken's egg and positive to the yolk (12 × 9 mm) and the white (10 × 13 mm) of quail's egg.

Total serum IgE was 367 kUI/L. Specific IgE to chicken's egg ovalbumin, ovomucoid, yolk and white was negative. The patient's specific IgE was under 0.35 kUI/L (class 0) for chicken's egg white, yolk, ovomucoid and ovalbumin.

We performed Immunoblot (Fig. 1) for the white of chicken egg (*Gallus domesticus*); quail (*Coturnix coturnix*); duck (*Anas domestica*); and goose (*Anser domestica*). In the white of the quail's egg, we recognised a band corresponding to a 75 kD molecular weight, which matches ovotransferrin's molecular weight. A similar band was not detected in the chicken, duck or goose eggs.

DISCUSSION

We present an unusual case of food allergy following the ingestion of uncooked quail's egg by a paediatric patient without previous history of chicken's egg allergy, with previous ingestion of quail's meat and boiled eggs. The results of the skin test, specific serum IgE and IgE Immunoblot confirmed an IgE mediated reaction.

The patient's sensitisation mechanism was probably through the ingestion of boiled quail's eggs, without previous clinical reaction, which leads us to suspect that the identified 75 kD protein is probably thermolabile. This protein should have lost its immunogenic capacity after boiling, as the patient had never experienced any symptoms before. This mechanism has been described in the bird-egg syndrome, and it is caused in that syndrome by a partially heat-labile albumin inhaled.

The sensitisation may have occurred in a previous deficient boil that did not completely denaturalise

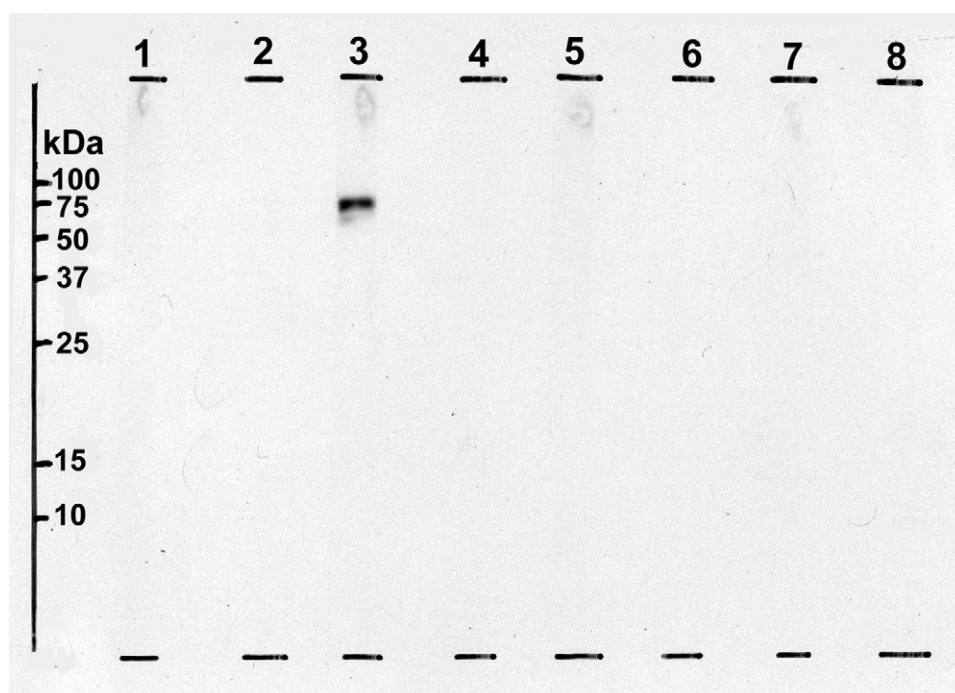


Figure 1.—Immunoblot for whites and yolks from different eggs performed in the patient.

Lane 1: White of chicken's egg.
 Lane 2: Yolk of chicken's egg.
 Lane 3: White of quail's egg.
 Lane 4: Yolk of quail's egg.
 Lane 5: White of duck's egg.
 Lane 6: Yolk of duck's egg.
 Lane 7: White of goose's egg.
 Lane 8: Yolk of goose's egg.

ovotransferrin, thus producing then an antigenic recognition.

Later, with a massive ingestion of antigens when consuming uncooked quail's egg, the anaphylactic reaction occurred, which motivated our study.

Eggs are one of the most common causes of food allergy in children. Its major allergens are ovoalbumin (Gal d 2), ovomucoid (Gal d 1) and conalbumin (Gal d 3). Other minor allergens have also been studied such as lysozyme (Gal d 4), used as an additive in a large amount of foods, but whose importance as an allergen has been undervalued, even though there have been many severe reactions reported in people with allergy to eggs. Chicken serum albumin (α -livetin) was described as a yolk protein related with the bird-egg syndrome². Quirce et al. have described this protein as Gal d 5.

Given its wide distribution and consumption, chicken's eggs are the most important allergologically speaking³. Therefore, allergy to other species' eggs are less frequent and are usually described in patients allergic to chicken's eggs. We are not aware of previous cases reported in sensitisation to bird's eggs without concomitant sensitisation to chicken's egg in children. There have been cases reported in adults with sensitization to duck and goose eggs⁴.

The possibility of a cross-reaction among proteins in the white of the eggs of different bird species has been reported. There are cases reported in which the sensitisation to the egg of one bird occurred first and eventually allergy to chicken's egg as a cross-reac-

tion. The white of the egg of other birds has a cross-reaction with most of the allergens present in the white of chicken's egg with the reactivity varying considerably, depending on the species.

Within the genera of the birds, we can find two Subclasses, and within the Subclass of the keeled birds (keeled sternum), multiple Orders. To two of these orders belong the four species we have used in our study. Within the Order of the Galliforme, we find two members of the Faisanidae Family, the chicken (*Gallus domesticus*) and the quail (*Coturnix coturnix*). On the other side within the Anseriforme Order, we find the goose (*Anser domesticus*) and the duck (*Anas domesticus*), which belong to the Anatidae Family. As Añibarro et al. described, the antigenic variability depends on the phylogenetic distance between the birds.

There are some proteins that may present cross-reaction when binding human IgE although they may belong to very different Orders (i.e. chicken and seagull), but have proteins with antigenic capacity, which may be Order specific. In Añibarro's article it is demonstrated how a protein belonging to the Anseriforme Order did not present cross-reaction with the proteins of the Gallinacea Order.

It has also been described how allergic patients with respiratory sensitisation to bird feathers, with time have presented sensitisation to egg yolk and eventually to the bird's meat as protein cross-reactivity, which is known as the bird-egg syndrome. Said syndrome has been reported basically in adults, al-

though there are cases described in children. It is referred to as this when there is a previous exposure to birds, which cause respiratory symptoms, and the egg's intolerance appears secondarily. Cases of primarily sensitisation to the bird's meat and later to the egg have also been described, without respiratory symptoms; this is known as bird-egg syndrome-like by some authors given the atypical characteristics but that definition is debatable.

On the other hand, other authors have described allergy to bird's meat in children and adults without sensitisation to eggs nor feathers.

The fact of having a considerable antigenic variability between the different species of birds, and consequently between the white of their respective eggs, indicates that the patients with allergy to chicken's eggs could tolerate the eggs of different birds. In the same way, a person who is allergic to other birds' eggs could tolerate chicken's egg, but we may not know if eventually he may present a cross-reaction in the future.

In egg-allergic patients with respiratory symptoms, it is necessary to exclude sensitization to bird proteins⁵.

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