

New Onset Egg Allergy in an Adult

M Ünsel, AZ Sin, Ö Ardeniz, N Erdem, R Ersoy, O Gulbahar, N Mete, A Kokuludağ

Ege University Medical Faculty, Department of Internal Medicine, Division of Allergy and Clinical Immunology, Bornova-Izmir, Turkey

■ Abstract

We report newly presenting systemic and local allergic reactions to egg in a 55-year-old woman. The patient did not have a history of egg allergy in childhood or occupational exposure to egg proteins; nor did she report any disease that is known to be related to food allergy. A skin prick test with commercial extracts, prick-to-prick test, CAP radioallergosorbent assay, and a double-blind, placebo-controlled food challenge test were used to prove egg allergy. Because egg allergy mainly affects children and symptoms frequently disappear with age, the late onset in this patient is rare.

Key Words: Egg allergy. Adult age. Double-blind placebo-controlled food challenge.

■ Resumen

Informamos de nuevas reacciones alérgicas locales y sistémicas al huevo en una mujer de 55 años de edad. La paciente no había tenido reacciones alérgicas al huevo en la infancia, no había estado expuesta por motivos laborales a proteínas del huevo ni informó de que tuviera ninguna enfermedad relacionada con alergia alimentaria. Para confirmar la alergia al huevo se empleó una prueba cutánea con extractos comerciales, una prueba de radioalergoadsorción CAP y una prueba de provocación alimentaria a doble ciego, controlada con placebo. Debido a que la alergia al huevo afecta principalmente a los niños y a que los síntomas desaparecen con la edad, el inicio tardío de la alergia en esta paciente es infrecuente.

Palabras clave: Alergia al huevo. Edad adulta. Prueba de provocación alimentaria a doble ciego controlada con placebo.

Introduction

Egg is one of the most common causes of food allergy. Although major allergens are heat sensitive it has been shown that egg white retains its ability to bind immunoglobulin (Ig) E in spite of heating [1]. Egg allergy mainly affects children. It is quite rare in adults and even in those cases clinical symptoms began in childhood or early adulthood [2].

Case Description

A 55-year-old woman reported episodes of eyelid and lip swelling, itching of the throat, ears and eyes, redness and watering of the eyes, hoarseness, shortness of breath, wheezing, and coughing. These episodes had begun 2 years earlier and had required many visits to the emergency department, where she was treated successfully with epinephrine, antihistamine, and steroids. Recently she realized that these symptoms came soon after she ate egg or egg-containing products such as cake or pastry. There was no history of atopic disease or drug

or insect sting allergy. She did not present a history of current or past exposure to bird antigens. She did not remember any kind of symptoms suggesting food hypersensitivity during her childhood. She had tolerated egg and egg-containing products until 2 years earlier. Episodic symptoms were not provoked by other foods, drinks, or drugs; nor had they appeared spontaneously at times when egg or egg-containing products had not been eaten. She did not report any systemic illnesses. She had been taking hormone replacement therapy for 14 years due to early menopause. The patient especially emphasized that her allergic symptoms after eating egg began 2 years earlier, after her 21-year-old daughter died from a brain tumor. The physical examination and routine laboratory tests were normal.

A skin prick test was performed with a large panel of commercial food allergen extracts as well as common inhalant allergens including pollens, dust mites, molds, and animal epithelia (cat, dog, horse, sheep, budgerigar) (Allergopharma, Hamburg, Germany). The patient showed a positive response only to animal epithelia among the inhalant allergens. Egg white, egg yolk and whole egg extract provoked positive

Skin Prick and Prick-to-Prick Test Results*

	Prick Test, mm	Prick-to-Prick Test, mm
Allergens		
Foods		
Egg white	5	15
Egg yolk	8	0
Whole egg	7	
Inhalants		
Cat epithelia	10	
Cow epithelia	6	
Horse epithelia	5	
Sheep epithelia	3	
Budgerigar epithelia	3	
Negative control	0	
Positive control	6	

*Values are expressed as means of the longest and the shortest wheal diameters in the presence of erythema.

reactions while results for other foods were negative (table). The patient was also skin tested with the prick-to-prick method by using egg boiled for 5 minutes at 100°C. In the skin area where egg white was applied in this test, mean wheal size and erythema were measured as 15 mm and 25 mm respectively, whereas the egg yolk reaction was negative.

Serum specific IgE to egg white was positive at 2+, at 2.8 kU/L but the assay was negative for egg yolk (CAP system Pharmacia, Uppsala, Sweden). As the double-blind, placebo-controlled food challenge has been accepted as the gold standard diagnostic test for food allergy, it was carried out with cooked egg white, which was found to be positive in all test methods. Additionally, the patient had reported the symptoms developed after ingestion of boiled egg or cooked products containing egg. We obtained written informed consent from the patient. The challenge procedure was a modified version of the one described by Nogaard and Bindslev-Jensen [2]. After ingestion of the placebo containing pure mashed potatoes, no objective or subjective symptoms were observed. Then well-cooked egg white was given at 30-minute intervals with incremental dosages (50 mg, 500 mg, 5 g, 50 g, 100 g) mixed thoroughly into mashed potatoes (5 g, 25 g, 50 g, and 100 g) until the objective symptoms and signs appeared. Before each active dosage, physical examination, blood pressure, pulse rate and respiratory function test measurements were performed. When the patient ate the 50 mg and then the 500 mg doses of egg white, she complained only of tickling in the throat and itching on the lips without any objective signs. After ingestion of 5 g of egg white, within a few minutes she felt swelling, burning and itching in the throat, dysphagia, itching in the ears, tinnitus, and headache. However, vital signs were within normal limits. But itching on the eyes began and then visible conjunctivitis, angioedema on the lips and eyelids and erythema on the trunk developed during the following 5 minutes (Figure 1a and 1b). Her blood pressure and heart rate did not change but wheezes

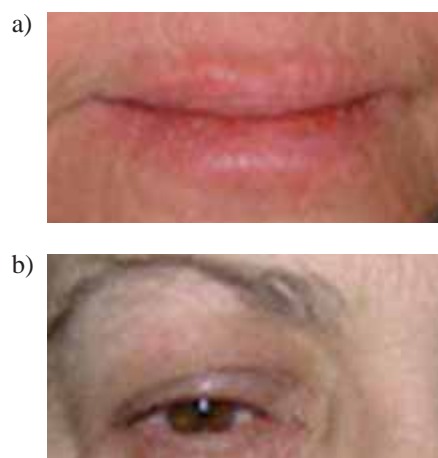


Figure 1. The patient's lips (a) and eye (b) after challenge.

PARAMETER	REF	POST	DIFF	%DIFF
VC	3.56	2.28	-1.2	-35.
FVC	2.92	2.32	-0.6	-20.
FEV ₁	2.84	2.16	-0.6	-23.
FEV ₁ %VC	79.7	93.1	13.3	16.7
PEF	6.29	4.09	-2.2	-34.

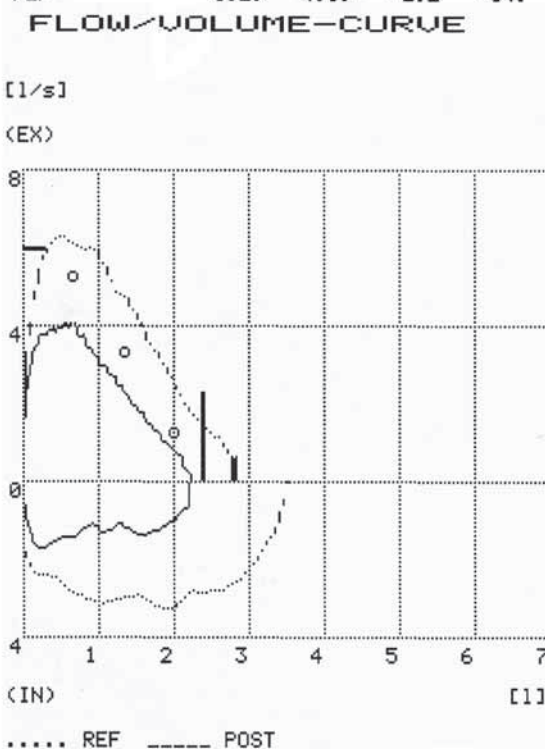


Figure 2. Flow volume curve after double-blind, placebo-controlled food challenge with 5 g of egg white. VC indicates vital capacity; FVC, forced vital capacity; FEV₁, forced expiratory volume in 1 second; PEF, peak expiratory flow; REF, reference values recorded before the food challenge test; POST, values recorded after the challenge test; DIFF, difference.

were detected on auscultation. Forced expiratory volume in 1 second decreased more than 20% below the prechallenge value (Figure 2). There was pharyngeal–laryngeal edema and erythema on indirect laryngoscopic examination. After that, the challenge test was terminated. Antihistamine and steroids were given intravenously in addition to an inhaled β_2 -agonist and 120 mg of fexofenadine orally. Her symptoms improved in the following hours and she was discharged.

Discussion

Adult-onset egg allergy has rarely been mentioned in the literature. Nogaard and Bindsvlev-Jensen [2] demonstrated positive double-blind, placebo-controlled food challenge findings with egg in 7 of 13 patients suspected of being allergic to egg. Among these patients, 4 reported that symptoms started between the ages of 0 and 5 years and the rest of them stated that their allergic complaints had begun when they were approximately 17 years old. Escudero and colleagues [3] reported on 4 patients working in the baking industry who were suffering from respiratory symptoms upon inhalation of aeroallergen particles coming from liquid or powdered egg white proteins. Their ages were between 27 and 54 years and controlled food challenge tests with egg white proteins were positive for all of them. Asero et al [4] reported the case of a 47-year-old woman who described an oral allergy syndrome after ingestion of various foods containing fresh egg but she could tolerate cooked egg.

It has been observed from previous reports that egg allergy in adults generally begins in childhood or early adulthood with severe systemic allergic symptoms. Our case was remarkable and different from most other adult cases in that complaints started at an older age, both local and systemic signs and symptoms were present, and occupational exposure was absent. Another interesting finding in our patient was the presence of asymptomatic sensitization to animal fur. The relationship between asthma and rhinoconjunctivitis due to bird feather sensitization and egg allergy has been described as a bird–egg syndrome related to the cross-reactive IgE antibody able to bind the egg yolk protein livetin and bird feather allergens [5]. The patients diagnosed as having bird–egg syndrome were usually adult females and they also had sensitization to animal fur. Bird–egg syndrome is characterized by respiratory and gastrointestinal symptoms. Asthma is the main symptom as a consequence of contact with birds and rhinoconjunctivitis may or may not develop. Sensitization to bird proteins precedes development of egg allergy, although sometimes the order of appearance is reversed. These patients are sensitized to other aeroallergens such as pollens, molds, or mites.

Quirce and colleagues [6] reported 8 patients diagnosed as having bird–egg syndrome. All of their patients gave a history of atopic disease and were found to be sensitized to both egg yolk and inhaled allergens such as pollen, dust mite, mold, or animal dander. Although prick tests with conalbumin were found to be positive in 6 of the 8 patients, most of them could tolerate well-cooked egg products.

Our patient differs from patients with bird–egg syndrome in many aspects. She has had no respiratory symptoms triggered by any kind of allergen and no history of having domestic pets including birds. She has systemic symptoms with cooked egg white rather than egg yolk and has no sensitization to other inhalant allergens. Specific IgE determinations by CAP radioallergosorbent assay for egg white allergens such as ovomucoid, ovalbumin, and conalbumin should have been carried out, but we could not perform these assays because they were not commercially available at that time. Skin prick tests with these egg white allergens could not be done for the same reason.

Similar proteins from different species may cause marked allergenic cross-reactivity. An allergen profile of feather extracts has not been fully defined as evident in our test material. However, feather keratin and albumin have been considered as the major allergens [7] and albumin might be responsible for cross-reactivity. In our case, prick test positivity to all animal extracts in the absence of clinical symptoms would possibly be explained by cross-reactivity. We considered the patient's diagnosis to be primarily egg allergy and prick test positivity to feather allergens was accepted as cross-reactivity resulting from the extracts containing common allergens such as albumin.

There are certain factors affecting the high incidence of food hypersensitivity in childhood such as lack of immunological oral tolerance, gastric or intestinal enzymes, and immature gastrointestinal mucosa. Furthermore, there is no IgA in the exocrine secretions of newborns. Immunological barriers together with physiological barriers and undamaged intestinal mucosa are very important in protection from food allergy. Intestinal inflammatory disorders including celiac disease, Crohn disease, and ulcerative colitis favor the development of food allergy possibly by disrupting oral tolerance and intestinal permeability [8]. The adult-onset egg allergy in our patient could not be ascribed to this kind of disease, however, as she did not have any suggestive history or positive laboratory finding.

In conclusion, our case was remarkable and different from other adult cases of egg allergy because complaints started at an older age, both local and systemic symptoms were present, and a history of occupational exposure and secondary disease was absent. We could not explain a reason that might explain the disruption of oral tolerance constituted in this patient's childhood. An interesting point is that her egg-allergy-related symptoms began soon after a reason for grief. Studies have shown that physical or psychological stress may alter intestinal microflora [9]. It could be hypothesized that stress might be responsible for disrupting oral tolerance to some antigens. In the future, it may be possible to learn more about complex neurological and immune system interactions.

The patient was advised to avoid the ingestion of egg and food products containing egg and to carry an automatic adrenaline injector.

References

1. Sampson HA, Cooke SK. Food allergy and the potential allergenicity–antigenicity of microparticulated egg and cow's milk proteins. *J Am Coll Nutr.* 1990;9:410-17.

2. Nogaard A, Bindslev-Jensen C. Egg and milk allergy in adults. *Allergy*. 1992;47:503-9.
3. Escudero C, Quirce S, Fernández-Nieto M, de Miguel J, Cuesta C, Sastre J. Egg white proteins as inhalant allergens associated with baker's asthma. *Allergy*. 2003;58: 616-20.
4. Asero R, Mistrello G, Roncarolo D. Unusual egg allergy in an adult. *Allergy*. 1999;54:1328-36.
5. Anibarro Bausela B, Martín Esteban M, Martínez Alzamora F, Pascual Marcos C, Ojeda Casas JA. Egg protein sensitization in patients with bird feather allergy. *Allergy*. 1991;46(8):614-18.
6. Quirce S, Marañón F, Umpiérrez A, Heras M, Fernández-Caldas E, Sastre J. Chicken serum albumin (Gal d 5) is a partially heat-labile inhalant and food allergen implicated in the bird-egg syndrome. *Allergy*. 2001;56:754-62.
7. Kilpiö K, Mäkinen-Kkiljunen S, Hahtela T, Hannuksela M, Allergy to feather. *Allergy*. 1998;53:159-64.
8. Crespo JF, Rodríguez J. Food allergy in adulthood. *Allergy*. 2003;58:98-113
9. Wright RJ, Cohen RT, Cohen S. The impact of stress on the development and expression of atopy. *Curr Opin Allergy Clin Immunol*. 2005;5:23-29.

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■ **Mehmet Ünsel**

Division of Allergy and Clinical Immunology
Department of Internal Medicine
Ege University Medical School
35100 Bornova-Izmir, Turkey
E-mail: unselmehmet@yahoo.com