

Quail Egg Anaphylaxis With Tolerance to Hen Egg: A Case of Occupational Exposure

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Occupational exposure to egg proteins through cutaneous contact or inhalation may lead to IgE-mediated sensitization. Allergy to egg proteins has been described in the food industry and in research workers, and symptoms can be topical or systemic. The phenomenon is mainly associated with hen egg. Allergy to quail egg in patients who tolerate hen egg is very rare. We present the first case of work-related anaphylaxis to quail egg in a patient who tolerated hen egg.

A 54-year-old man reported an episode of anaphylaxis following the intake of quail egg. He had been a poultry worker for 17 years, and during that time he was repeatedly exposed to hen and quail feathers, feces, and eggs. Ten years after starting work on a poultry farm, he developed dyspnea and wheezing exclusively in the workplace. Three years later, he developed generalized urticaria, severe oropharyngeal pruritus, dysphagia, dyspnea, and stridor 30 minutes after eating cooked quail egg. Prior to this anaphylactic reaction, he tolerated both hen egg and quail egg. He subsequently avoided both types, although he tolerated quail, turkey, and chicken meat. Skin prick tests for hen egg (white, yolk, ovalbumin, and ovomucoid) and chicken meat using commercial extracts (Roxall) were negative. Skin prick-prick tests were positive for raw quail egg white (17×9 mm) and yolk (9×9 mm), boiled quail egg white and yolk (4×4 mm), and raw and boiled hen egg white (4×4 mm) and yolk (4×4 mm). Specific IgE assays (ImmunoCap, Thermo Fisher Scientific) were negative for hen meat, hen egg yolk and white, and hen egg ovomucoid and ovalbumin. An oral food challenge (OFC) was performed with pasteurized egg white (total dose of 48 mL, corresponding to 1 natural raw egg) with no reaction. OFC with quail egg was not performed owing to the risk of anaphylaxis.

Sodium dodecyl sulphate–polyacrylamide gel electrophoresis (SDS-PAGE) and immunoblotting were performed using the Laemmli method under reducing conditions with 2-mercaptoethanol and 20-μg protein extracts per lane from quail egg white and yolk, hen egg white and yolk, and α-livetin (chicken serum albumin, Sigma Chemical Company). Patient serum was diluted 1/3 and 1/8. The immunoblot assay revealed 2 IgE-binding bands of 97 kDa

and 60 kDa and an intermediate zone measuring 32–45 kDa (2 bands) in quail egg white; the molecular weight of these bands matched that of ovotransferrin, ovalbumin, and ovomucoid, respectively (Figure). No bands were detected with patient serum and extracts from hen egg and hen α-livetin; similarly, no bands were detected with control serum (pool of sera from nonatopic individuals) or with all the studied extracts. 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 quail's egg could tolerate the eggs of different birds. The patient currently tolerates hen eggs and quail, turkey, and chicken meat.

The prevalence of sensitization to egg in adults ranges from 0.35% to 1.9% and has been previously reported among workers in the bakery and confectionery industries exposed to egg protein aerosols found in the glazing of bakery products. Sensitization has also been observed in research workers who handle egg, thus suggesting an inhalational and/or cutaneous route of sensitization [1-3]. The symptoms reported by sensitized workers include occupational asthma and rhinoconjunctivitis [2-4]. The symptoms reported on ingestion were immediate, consistent with an IgE-associated response including urticaria, esophageal itching, dysphagia, and asthma.

Allergy to egg from other bird species, namely, quail egg, in hen egg-tolerant patients is very rare. The literature on quail egg allergy in hen egg-tolerant patients is limited to 1 case report and a case series [5-6]. The main quail egg allergen is ovalbumin, although other allergens have also been identified, namely, ovomucoid and ovotransferrin. These proteins did not cross-react with the proteins of hen egg. The authors report the first case of work-related quail egg allergy with tolerance to hen egg.

IgE-mediated sensitization to quail egg was demonstrated by positive skin prick-to-prick test to quail egg. The SDS-PAGE immunoblotting assay pointed to sensitization to quail egg ovotransferrin, quail egg ovalbumin, and quail egg ovomucoid as allergens in this case; no cross-reactive serum IgE with its homologs in hen egg was detected. Quail egg differs from other bird eggs, particularly in its white, and is richer in proteins with anti-allergic and anti-inflammatory effects [7]. The considerable antigenic variability between the

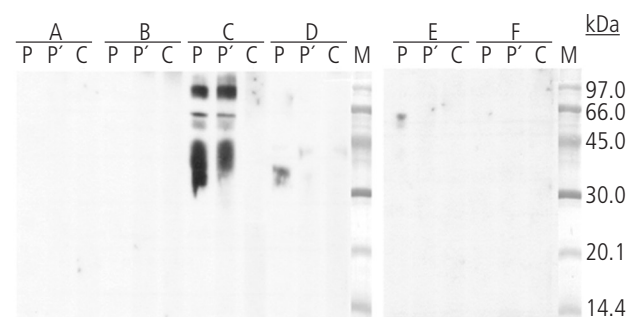


Figure. SDS-PAGE immunoblotting. A, α-livetin from hen; B, hen feather extract; C, quail egg white extract; D, quail egg yolk extract; E, hen egg white extract; F, hen egg yolk extract. Lane P, P', patient serum (2 dilutions); Lane C, control serum (pool of sera from nonatopic individuals); Lane M, molecular mass standard.

different species of birds, and, consequently, between the white of their respective eggs indicates that patients with allergy to quail egg can tolerate the eggs of various birds.

In this case, quail egg sensitization may result from chronic occupational exposure. The previous onset of respiratory symptoms in the workplace and the quail egg systemic reaction following months of daily contact with quail products suggests sensitization to allergenic quail egg proteins through contact and/or inhalation. Over time, allergic patients with respiratory sensitization to bird feathers develop sensitization to egg yolk and eventually to the bird's meat, as the same protein is present in both allergen sources, in what is known as bird-egg syndrome. We were able to rule out this syndrome, since sensitization to α -livetin was excluded [8].

In the case we report, the patient was exposed to both hen egg and quail egg in the workplace but was sensitized only to quail egg. It was speculated that this might be due to the irregular consumption of quail eggs, which began after the patient started work in the poultry farm, in contrast to hen egg, which was regularly consumed and had been well tolerated since childhood. Another, anecdotally reported possibility is that quail eggs are more difficult to "window," thus ultimately leading to greater exposure to egg allergens [3].

In conclusion, chronic exposure in occupational settings may cause de novo sensitization to quail egg proteins through inhalation or skin contact. Severe reactions can occur after ingestion in sensitized individuals. Food allergy via routes other than ingestion is probably underrecognized and underreported. It would be interesting to perform specific studies to demonstrate occupational exposure and sensitization by inhalation.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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