



Letter

Salmon roe (ikura)—induced anaphylaxis in a child

Anaphylaxis is a potentially fatal IgE-mediated allergic reaction of rapid onset. Food ingestion comprises nearly 50% of patients with anaphylaxis presenting to emergency departments in the western world.¹ In the United States, 15 million Americans are believed to have food allergies, which correlates to 1 in every 13 children younger than 18 years.¹ The most common food allergens are milk, egg, wheat, soy, peanuts, shellfish, tree nuts, and fish. Roes from fish or other aquatic species are not commonly reported as a cause of food allergy in the United States, although it is a much more common allergen in Japan, where fish roe is consumed widely.² The roes of various species of fish are harvested and often cured with salt. This is a delicacy commonly consumed in Japan and is served in sushi dishes. Sushi has become increasingly popular in the United States and elsewhere, and clinicians should be aware of allergy to roe when evaluating patients with anaphylaxis after ingestion of seafood. Cases of roe-induced allergy have been previously reported in numerous children from Japan^{2–4} and more recently in 3 children from France.⁵ We report the first case in the literature of anaphylaxis in the United States secondary to salmon roe in a young child.

An 18-month-old white boy was seen in consultation for an anaphylactic reaction after ingestion of Thai food and sushi. He had a history of bronchiolitis and repeated episodes of wheezing with upper respiratory tract infections. He began developing eczema at the age of 2 months, requiring topical emollients and intermittent hydrocortisone cream. He ingested beef and chicken satay without peanut sauce, sticky rice, a shrimp dumpling, and a bite of salmon sushi topped with salmon roe. Within 15 minutes after ingestion he developed generalized urticaria. He vomited once but had no respiratory distress or wheezing and no angioedema. His parents gave him 6.25 mg of diphenhydramine by mouth, but the hives persisted for several hours. He was taken to an emergency department, where he was given intramuscular diphenhydramine with resolution of hives, but with 1 more episode of emesis. He did not receive epinephrine but subsequently did well, with no further symptoms, and was discharged home.

He had previously eaten Thai food without a reaction, but this was the first time he had eaten at that restaurant and the first time he had eaten sushi. Family history was remarkable for peanut allergy in his brother. His mother had seasonal allergies. Physical examination findings were unremarkable.

The results of skin prick testing (SPT) with the Multi-Test device (Lincoln Diagnostics Inc, Decatur, Illinois) were negative to commercial allergen extracts of peanut, shrimp, walnut, milk, casein, fish mix (Greer Labs, Lenoir, North Carolina; contains codfish, flounder, halibut, mackerel, and tuna), soy, egg, beef, chicken, sesame, and wheat. In vitro specific IgE produced a positive result to salmon caviar (1.61 kU/L [IBT reference laboratory]) but less than

0.35 kU/L to peanut, rice, shrimp, soy, and salmon. At a subsequent visit, SPT with cured salmon roe (ikura) was performed. Salmon roe was mashed, and SPT was performed in duplicate by prick puncture technique directly through the salmon roe on the skin. After 15 minutes, he had large skin test reactions with a 14-mm wheal and 28-mm flare on the first test and a 15-mm wheal and 30-mm flare on the second test. The results of additional SPT performed at a second visit were negative to clam, scallop, and lobster.

Our patient is the first child confirmed to be allergic to fish roe in the United States. He developed an anaphylactic reaction that consisted of hives and vomiting shortly after ingestion of sushi topped with salmon roe. Allergic sensitivity was confirmed both by in vitro IgE testing and skin testing with roe. We did not perform an oral challenge in our patient, given the severity of the initial reaction.

Roes from fish or other aquatic species are enclosed in the ovarian membrane. Roes can vary in terms of size and color, depending on the species. Roes are available from various species of fish, including salmon, cod, herring, pike, smelt, ruffe, and others, and are often eaten raw in sushi dishes. There have been case reports of anaphylaxis in both children and adults related to fish eggs or roes of salmon, sturgeon (Russian beluga), whitefish, herring, pollock, trout, and sea urchin.^{3,5–10}

In Japan, with food allergies on the rise, seafood was recognized as a major allergen. In 2002, under the Japanese food sanitation law, salmon roe has been listed as a food allergen. In a study by Shimizu et al,² the major and minor allergens in 4 kinds of salmon roes were investigated using serum samples from 20 children aged 2 to 11 years allergic to salmon roe. They examined IgE cross-reactivity by competitive enzyme-linked immunosorbent assay. Lipovitellin and β -component, which are subfragments of the yolk protein vitellogenin, were found to be the major protein components in salmon roe.² All serum samples from 20 patients revealed IgE reactivity to the β -component of vitellogenin, whereas only 9 of 20 patients' serum samples had specific IgE reactivity to lipovitellin.² There does not appear to be any cross-reactivity between salmon roe and either salmon muscle or chicken egg proteins.⁴

Our patient developed a severe reaction to roe without concomitant fish allergy. Mäkinen-Kiljunen et al¹⁰ reported 2 cases of patients with positive SPT results to roe with negative SPT results to fish and shellfish. The patients also had elevated roe specific IgE levels. Immunoblot inhibition studies were performed to evaluate the cross-reactivity between the roe and the fish. They concluded that IgE sensitization caused by fish roe can occur without the presence of a fish allergy.¹⁰

Patients with allergic reactions to seafood, especially sushi, may be allergic to fish roe. Sushi has become more popular in the United States, and roe is often served with other seafood. We recommend testing for roe allergy in patients who test negative for fish or shellfish allergy when there is a suspicion of seafood allergy.

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