pumpkin, and broccoli.[8] If an infant tolerates a variety of these foods, then subsequent introduction might be more liberal. We followed these recommendations and the patient has not presented other episodes of FPIES; he is thriving within normal ranges. Only banana and legumes are being avoided since his mother noticed mucus stools and irritability in the infant when she ate these foods while breastfeeding.

In summary, we report a case of suspected acute FPIES to CM in an infant. We could not confirm it with reintroduction of CM in the maternal diet or by oral FC, given the severity of the clinical picture. Acute FPIES through breast milk may happen and can be potentially severe. In these rare cases, we believe that an individualized therapeutic approach should be made regarding maintenance of breastfeeding and foods that the mother should avoid during this period.

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Aldolase
A new Crustacea allergen

Crustacean allergy is one of the most frequent causes of food allergic reactions, not just by ingestion but also by inhalation.[1] Tropomyosin is considered the major allergen and is responsible of most crustacean allergic reactions. We present a near-fatal case of anaphylaxis attributable to allergy to Crustacea with exclusive sensitization to an infrequent shellfish allergen: aldolase.

A 33-year-old patient with tree nut allergy and a history of mild bronchial asthma attributable to allergy to home dust mites was undergoing exclusive treatment with salbutamol when needed. Four years previously, he presented with facial erythema, nausea, and tachycardia after ingesting marzipan with almonds. Skin prick tests were performed at another medical center with positive results for tree nuts and Pru p 3. Since then he has followed a tree nut–free diet, although he tolerates foods with trace amounts of tree nuts.

In September 2014, he presented with facial erythema, nausea, generalized hives, inspiratory stridor, hypotension, and loss of consciousness immediately after the ingestion of shrimp, tomato, rape, bread, and clams, requiring adrenaline, intubation, and an intensive care unit stay of 2 days. He had no history of nonsteroidal anti-inflammatory drug intake or physical exercise. He has since tolerated all other foods ingested that day (tomato, rape, and bread) and all types of fish and vegetables, except for crustaceans and mollusks, which he has not eaten again.

Complementary Exploration

Food Skin Prick Tests

Food skin prick tests were positive for Pru p 3 and extracts from walnut, hazelnut, peach, and apple and negative for *Penaeus* species tropomyosin (Roxall, Bilbao, Spain) and extracts from megrim, monkfish, cod, anchovy, clam, mussel, and prawn. The results of prick by prick testing with shrimp (*Penaeus notalis*) obtained at a local market (first pricking the fresh food with the lancet and then pricking the patient's skin) were positive (5 × 5 mm).

Total IgE and Serum Specific IgE

The patient's total IgE level was 31 IU/mL. The patient's serum specific IgE had extracts from peanut, cashew, pistachio, hazelnut, almond, chestnut, mussel, clam, megrim, sole, *Anisakis* species, langust, lobster, and shrimp (<0.1 kU/L) and extracts from apple (0.32 kU/L), walnut (0.51 kU/L), and the following components: rPru p 3 (0.79 kU/L), rAra h 9 (0.32 kU/L), rJug r 3 (0.27 kU/L), rDer p 10, and rPen a 1 (<0.1 kU/L) (ImmunoCAP System, ThermoFisher, Waltham, MA).

Other Tests

Oral challenge tests with clam, almond, walnut, peanut, pistachio, hazelnut, apple, and peach were tolerated. We dismissed an oral challenge test with shrimp because of the severity of the clinical reaction presented.

Protein extracts from raw and boiled (100° C for 15 minutes) Northern brown shrimp body (*Penaeus aztecus)* were prepared by homogenization in phosphate buffered saline, dialyzation, and lyophilization.

Sodium dodecyl sulfate–polyacrylamide gel electrophoresis immunoblotting under electrophoretic reducing conditions (with 2-mercaptoethanol) was performed (Fig 1). An IgE-binding band of 38 kDa was detected in both raw and boiled *P aztecus* extracts. The immunoblot with *Penaeus monodon* tropomyosin (Pen m 1) tested negative (data not shown). IgE-binding band was extracted from the gel, and protein was identified as previously described[2] as fructose 1,6-biphosphate-aldolase from *P aztecus*.

Skin prick testing was performed with the *P aztecus* extract used in immunoblotting assay obtaining positive results (6 × 8 mm). Skin prick testing with this extract gave negative results in 10 dust mite allergic patients.

Discussion

Our patient presented with a life-threatening anaphylaxis after the ingestion of shellfish attributable to fructose

Disclosures: Authors have nothing to disclose.

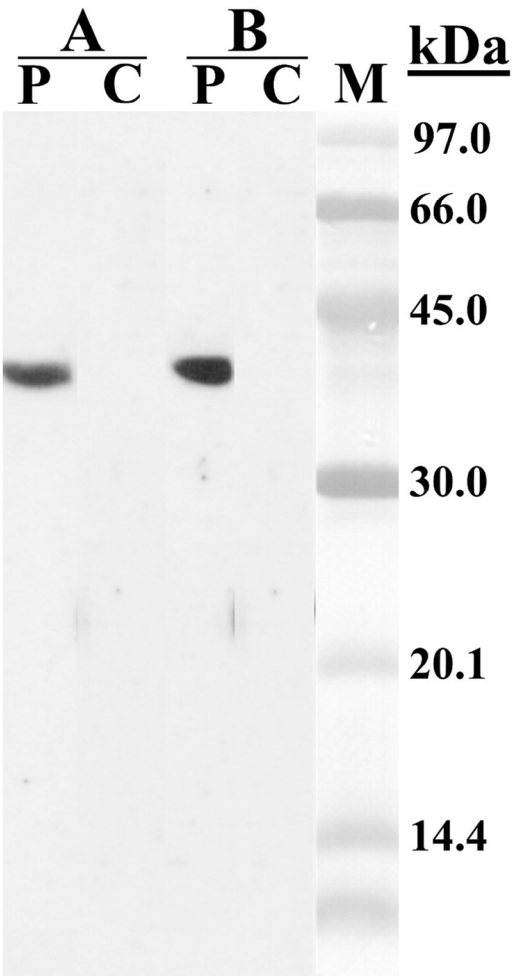

Figure 1. Sodium dodecyl sulfate–polyacrylamide gel electrophoresis immunoblotting results. An IgE-binding band of 38 kDa was detected in both raw (A) and boiled (B) *Penaeus aztecus* body extracts. Lane P, patient serum; lane C, control serum (pool of serum samples from nonatopic individuals); and lane M, molecular mass standard.

1,6-biphosphate-aldolase allergy. Presumptive shrimp allergy was diagnosed by history and exclusion of other foods by food challenges.

Immunoblotting with *P aztecus* extract revealed only one IgE-binding band of 38 kDa that was identified as aldolase, and we obtained a positive prick test result with the *P aztecus* extract used in the blotting assay. Both in vivo and in vitro studies have demonstrated sensitization to aldolase, without sensitization to any other crustaceous allergen, including tropomyosin.

The allergenic character of the aldolase protein has been previously described in a broad spectrum of living organism: fishes, *Anisakis simplex*, chicken, cassava, *Vespa affinis* venom, and *Candida albicans*.[3,4] Furthermore, previous studies[5,6] have pointed to the aldolase protein as a possible crustacean allergen. Cross-reactivity with clinical implication has been described between aldolases that belong to the vertebrate subphylum (cod and chicken).[7] Cross-reactivity between the *Penaeus* aldolase and some other invertebrate aldolases as the protein homology (Hymenoptera, Diptera, Arachnida) is higher than 70% (Basic Local Alignment Search Tool [BLAST] study). Cross-reactivity between *Penaeus* and vertebrate aldolases is unlikely. However, this cannot be ruled out because cross-reactivity between invertebrate and vertebrate proteins have been described recently.[8]

In our case, the patient is sensitized only to aldolase among the crustacean allergens and does not seem to have a clinical crossed reaction to other aldolases, such as the ones in fish and chicken, given the patient regularly consumes these foods. It has been pointed out that shrimp aldolase is a heat labile allergen.[6] However, in our case, we detected IgE binding to *P aztecus* aldolase in both raw and cooked (100°C for 15 minutes) extracts. The lack of correspondence between our results and the previous ones on aldolase stability could be explained by the high sensitivity we had to use in our immunoblotting assays to detect the aldolase specific IgEs. The negative results obtained with other shrimp extracts (ImmunoCAP assay and commercial shrimp extracts) suggest that the aldolase would be present in low quantity in shrimp extracts, and it is probable that the cooking process further reduces the amount of soluble aldolase protein in cooked shrimp extracts (partial thermal denaturation and precipitation), so perhaps the sensitivity of the assays could be the reason for this lack of correspondence.

Shrimp allergic patients from our region (north of Spain) had a sensitization frequency to this protein of 10%.[5] Its presence in usual diagnostic extracts seems to be low, given the negative results obtained with the prick tests with standard commercial extracts and the in vitro specific IgE determination. Only with the extract used in the immunoblotting assay that contained this aldolase could we demonstrate the presence of serum specific IgE.

We present a case of an almost deadly anaphylaxis by Crustacea ingestion with unique sensitization to a minor allergen, aldolase. Despite being pointed out that this allergen is heat labile, the conditions of usual cooking of these foods allow this protein to maintain its allergenic character. For the diagnosis of patients with exclusive sensitization to this allergen, the commercial diagnostic extracts do not seem to be useful.

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