Anaphylactic shock to oysters and white fish with generalized urticaria to prawns and white fish

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SUMMARY

Because seafood consumption is moderate-to-high in Spain, allergic reactions to seafood such as fish, crustacea and mollusc are fairly frequent. The clinical features of these reactions depend on the implicated species and whether the reaction is provoked by ingestion, handling or vapor inhalation. Because different species have common antigenic structures, cross-sensitization is frequent, especially between crustaceans and molluscs. Contamination of fish by nematodes *(Anisakis)* may produce severe reactions.

We report the case of a female patient with no personal or family history of allergy who experienced two episodes of anaphylactic shock: the first occurred immediately after eating oysters and the second after ingestion of white fish. The patient also developed generalized urticaria provoked by crustacean (prawns) and white fish. The results of skin prick tests were negative for fish, shellfish, crustacean and oysters while *in vitro* tests were positive for oyster, prawns, *Anisakis*, *Ascaris* and *Echinococcus*, although stool samples and gastric endoscopy were negative.

Key words: Anaphylactic shock. Urticaria. Oysters. White fish. Prawns. *Anisakis simplex. Ascaris* Skin prick tests. *In vitro* test.

INTRODUCTION

Since ancient times, it has been known that certain foods can be healthy for some people and a violent mortal poison for others. This phenomenon was described by the Greek author Tito Lucrecio Caro (460-376 BC) in his book " De rerum natura" while Hippocrates (460-370 BC) stated that milk could cause urticaria. Later, passive transference with an allergenic food, fish, was described by Prausnitz and Kustner in 1921.

According to population surveys, food allergy is a significant health problem in several countries (1-6). An epidemiological, clinical and sociological study of allergic disease performed in Spain in 1992 in collaboration with 265 epidemiologists and using data from more than 4000 patients reported that over 145 patients (> 3.6 %) had food allergy, making this allergy the fifth most frequent disease studied by allergy specialists (7). In 1986, Blanco Quiros et al. (8) carried out a study in 7142 patients from the entire Spanish population and found that 6.7 % of the patients suffered from food allergy, representing a frequency higher than that found in the study Alergólogica (7).

Allergy to fish, crustaceans and molluscs is frequent in Spain due to the high consumption of these foods. Allergy to white fish is more frequent than allergy to blue fish (6). In sensitized individuals, clinical signs of allergy can develop after ingesting meat and other food from animals such as pig or chicken that have been fed fish-meal (9). Fish is a significant cause of allergy in children and adults in Scandinavian countries where fish consumption is widespread and also causes frequent adverse reactions, whether toxic or infectious, with a difficult differential diagnosis (10). Of 608 different allergic reactions to food, fish is the second most frequent (17.8 %) in pediatric patients (11). Allergic reactions to fish are relatively frequent in Spain, where 18 % of the children are sensitized (12). Allergic reactions to mollusc and crustacean affect both consumers and workers handling this food (12-14). In adults, consumption of mollusc and crustacean is a significant cause of allergy after fresh fruits and peanuts. Adverse reac-

tions can be due not only to animals, but also to contaminants such as bacterial toxins from animal chemical additives and spices used in cooking. These adverse reactions can be immediate or delayed.

Many studies of allergy to fish, crustacean and mollusc have been published by authors from Spain (6, 9, 12, 13, 15-20) and other countries (21-25). For some authors (26) allergic reactions to molluscs have not been as well studied as those to fish or crustaceans.

CLINICAL CASE

We describe the case of a 54-year-old woman who presented in March 2001 complaining of the following. About two years previously, while in Vigo, she had eaten oysters and soon after had developed anaphylactic shock requiring hospitalization until improvement. Since then, she had not eaten mollusc. In summer 2000 she developed generalized urticaria shortly after eating prawns. In February 2001, she developed generalized urticaria and anaphylactic shock two hours after eating whiting and required emergency hospital treatment until improvement. When we saw her last March she was symptom-free. She had contact with a dog.

The patient's medical records revealed that she had undergone hysterectomy and had developed a urinary infection. There was no family history of allergic disease. Physical examination revealed no significant findings. Skin prick tests were negative for blue fish (tuna, anchovy, sardine), white fish (cod, hake), and crustaceans and molluscs (mussel, oyster, clam and squid). Similar tests with dog epithelia were negative. No other tests for aeroallergens or food were performed.

Complementary analyses disclosed 4,600,000 red blood cells/mm^3, hematocrit 40.2%, hemoglobin 13 g/dl, 207,000 platelets/mm^3, 5,000 leucocytes/mm^3, lymphocytes 42.7%, phagocytes 49.4%, eosinophils 5.5%, basophils 0.6% and monocytes 6.4%. Erythrocyte sedimentation rate was 25 mm/h. Urine analysis was normal. General biochemistry: blood glucose 92 mg/dl, urea 30 mg/dl, creatine 0.73 mg/dl, uric acid 3.7 mg/dl, total cholesterol 199 mg/dl, triglycerides 72 mg/dl, total protein 6.6 g/dl. Seroenzymes: GPT/ALT 11 IU/l, gamma-GT 14 IU/l and alkaline phosphatase 133 IU/l. Electrolytes: sodium 140 mmol/l, potassium 3.9 mmol/l, chloride 106 mmol/l, phosphorus 3.0 mg/dl and calcium 9.7 mg/dl. Total IgE > 1000 IU/ml. Specific IgE to food: white fish = 0.00 KU/l; prawns = 0.86 KU/l; lobster = 1.36 KU/l; oyster = 1.01 KU/l; wheat flour = 0.38 KU/l: cornflour = 0.372 KU/l. Specific IgE to parasites: *Ascaris* = 40.90 KU/l; *Echinococcus* = 1.67 KU/l; *Toxocara* = 0.00 KU/l; *Anisakis* = > 100 KU/l. No parasites or eggs were found in the stool specimen. X-ray of the thorax and paranasal sinuses revealed no significant abnormalities. Abdominal scan revealed a 7-mm nodular hyperechoic image that, according to the radiologist, could correspond to either a granuloma or a small angioma. No other abnormalities were found.

Because the presence of the fish parasite *Anisakis* was suspected, digestive endoscopy was performed with a negative result. Four months later new control *in vitro* tests for parasites and total IgE were performed with the following results: specific IgE to parasites: *Ascaris* = 48.00 KU/l; *Echinococcus* = 1.05 KU/l; *Toxocara* = 0.00 KU/l; *Anisakis* = > 100 KU/l. Total IgE: > 5000 IU/ml.

On the basis of these findings, the patient was diagnosed with anaphylactic shock to oysters, generalized urticaria to crustaceans (prawns) and anaphylactic shock to white fish with generalized urticaria and *in vitro* hypersensitivity to *Anisakis*, *Ascaris* and *Echinococcus*.

Neither skin prick tests nor *in vitro* tests showed high sensitivity to white fish.

As treatment, we advised the patient to avoid eating oysters, crustacean and white fish.

DISCUSSION

Allergic reactions to oyster *(Ostrea edulis)* were reported in 1965 by Mac Farren et al. (21). These authors described ciguatera poisoning after ingestion of oysters and shellfish that had been cultured in the presence of the dinoflagellate *Gymnodinium breve*. Soon after, Wada et al. (22) and Nakasuima (23) reported cases of asthma among workers handling oysters. Maulitz et al. (24) reported the case of a 31-year-old man who experienced two anaphylactic shocks after eating oyster for the fist time and prawn for the second time followed by exercise. This patient showed a positive skin reaction to oyster, shellfish, prawn and crab extracts. He also showed specific IgE to all these foods, but presented no clinical manifestations after eating any of them, unless he took strenuous exercise afterwards.

McCants and Lehrer (25, 26) demonstrated through RAST inhibition that oyster and some crustaceans have common antigenic structures. This was the basis of reactivity to oyster after sensitization to crustaceans. These authors proposed two hypotheses to explain this finding: (i) similar antigenic structures could be related to a common ancestor and could have been maintained in both phyla; (ii) small crusta-

ceans and larvae are part of the diet of oysters and allergens from them could be incorporated into oysters. However, their studies also suggest that oyster-specific IgE are not always involved in immunopathogenic reactions to oyster.

Carston described two patients who were highly sensitive to smell (inhalant allergy): the first showed sensitivity to garlic and the second to fish (cod, plaice, halibut, mackerel and tuna), shellfish (clam, oyster and scallop) and molluscs (crab and prawn). These patients were successfully treated with injection immunotherapy. The author proposed that the treatment of such cases should be similar to antivenom immunotherapy and noted that IgE levels continuously decreased during the treatment. In addition, oysters contaminated with Norwalk virus have provoked food poisoning leading to cases of viral gastroenteritis (28, 29).

In Spain, Castillo et al. (16) published a study of 48 patients with hypersensitivity to shellfish. They performed skin tests with both crude and boiled extracts, measured total and specific IgE levels and found that the most common diseases were urticaria/angioedema in 39 patients, asthma in 18 and rhinitis in 14. There were no cases of anaphylactic shock. In general, skin tests gave better results than CAP. These authors subsequently published a further study of 148 patients with food hypersensitivity. Of these, 33 patients showed anaphylactia, in addition to related conditions (asthma, oral syndrome, urticaria/angioedema) and 50 patients showed hypersensitivity to shellfish, especially to prawn and squid.

Laffond (15) reported cases from the Allergy Services of the *Hospital Infantil Nino Jesus* in Madrid and the *Hospital Universitario de Salamanca*. This author performed both skin and *in vitro* tests (total IgE, specific IgE and RAST inhibition) and found sensitization to molluscs, molluscs plus crustaceans, and crustaceans alone. The most important signs were urticaria/angioedemas (94%), rhinoconjunctivitis (51%), asthma (36%), digestive symptoms (16%) and anaphylaxis (14%). Specific sensitivity to molluscs developed in only one case. Fifty-one percent of the patients reported symptoms after inhaling either fresh food or smoke from cooked food and 45% reported symptoms after direct contact with skin. Two percent of the patients showed positive RAST to *Anisakis*. Studies of RAST inhibition confirmed cross-reactivity between different molluscs and between molluscs and crustaceans.

In another study of fish allergy and of shellfish cross-reactivity between different fish species, Lasso and Laffond (12) noted that even in the presence of specific IgE antibodies to fish (as detected by skin prick test and/or RAST), tolerance to this food could be high. Thus, before prescribing a fish-free diet, sensitivity should be verified with a challenge test; the most frequent clinical symptoms are erythema, urticaria, angioedema, and in some cases, anaphylactic reactions. These symptoms can be triggered by ingestion, inhalation of smoke from cooked food, or direct contact. The manifestations of reactions to shellfish and molluscs are similar to those described above. Interestingly, 72% of patients had specific IgE antibodies to fish and to the cephalopod parasite *Anisakis simplex*, especially in the group of patients with allergy to molluscs and crustaceans. Similarly, these authors described cross-reaction between some mites and prawns, as well as between shellfish and some insects, Hymenoptera and nematodes (*Ascaris*).

In children, Botey et al. (20) observed symptoms of food allergy in cases of intestinal parasitosis, which disappeared after treatment.

As reported by Lopata and Potter (27), an atypical or inconsistent history suggests contamination with toxins and/or parasites such as *Anisakis*. According to these authors, intolerance reactions should be confirmed with double-blind studies. Our patient had no family or personal history of allergy before the anaphylactic shock to oysters. The generalized urticaria produced after eating prawns could have been due to cross-reaction between molluscs and crustaceans, as has been described. However, it is surprising that the generalized urticaria and anaphylactic shock were produced after eating white fish without previous symptoms from contact or inhalation, suggesting that the fish were contaminated by nematodes *(Anisakis)*, although no traces of this parasite were detected by gastric endoscopy. Possible contamination during the *in vitro* test protocol cannot be ruled out. Skin prick test demonstrated no hypersensitivity to any of the indicated foods and hypersensitivity to oysters and prawns was only detected because of the presence high levels of specific IgE. Moreover, as discussed above, the associated parasitosis demonstrated by *in vitro* tests could promote sensitization to food and/or form a part of the allergic response. The high levels of total IgE were surprising, not only in the first determination, but also in the second, where they were even higher.

Because of the severity of the anaphylactic episode to white fish, we did not perform challenge tests.

We will perform a clinical and immunological follow-up of this patient.

RESUMEN

Como el consumo de alimentos procedentes del mar en España es de moderado a elevado, las reacciones alérgicas a pescados, crustáceos y moluscos son bastante frecuentes. Las características clínicas de dichas reacciones dependen de las especies implicadas y de si la reacción está provocada por ingestión, manipulación o inhalación de vapores. Como distintas especies tienen estructuras antigénicas comunes, la sensibilización cruzada es frecuente, especialmente entre los crustáceos y los moluscos. La contaminación del pescado por nematodos *(Anisakis)* puede producir reacciones graves.

Describimos el caso de una mujer sin antecedentes personales ni familiares de alergia que experimentó dos episodios de shock anafilático: el primero se produjo inmediatamente después de tomar ostras y el segundo, después de comer pescado blanco. La paciente también sufrió una urticaria generalizada provocada por crustáceos (gambas) y pescado blanco. Los resultados de las pruebas de punción cutánea fueron negativas para pescado, mariscos, crustáceos y ostras, mientras que las pruebas *in vitro* fueron positivas para ostras, gambas, *Anisakis*, *Ascaris* y *Echinococcus*, si bien las muestras de heces y la endoscopia gástrica resultaron negativas.

Palabras clave: Choque anafiláctico. Urticaria. Ostras. Pescado blanco. Gambas. *Anisakis simplex*. *Ascaris*. Pruebas de punción cutánea. Prueba *in vitro*.

AGRADECIMIENTOS

Al laboratorio UCB Pharma por la colaboración bibliográfica que nos han prestado.

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