ARQUIVOS DE ASMA, ALERGIA E IMUNOLOGIA

Limpet anaphylaxis: a rare case

Anafilaxia à lapa: um caso clínico raro

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ABSTRACT

Limpet (*Patella vulgata*) is a mollusk mainly found in warm coastal regions. Limpet allergy is considered rare, and few cases can be found in the literature. We describe a clinical case of limpet anaphylaxis, including *in vitro* and *in vivo* evidence of IgE mechanism involvement.

Keywords: Food hypersensitivity, anaphylaxis, limpet, shellfish hypersensitivity.

RESUMO

A lapa (*Patella vulgata*) é um molusco frequentemente encontrado em regiões costeiras com clima quente. A alergia alimentar à lapa é muito rara, com poucos casos descritos na literatura. Os autores descrevem um caso de anafilaxia à lapa, com evidência de reação de hipersensibilidade do tipo I, através de IgE específica positiva à lapa, tanto com métodos *in vivo*, como *in vitro*.

Descritores: Alergia alimentar, anafilaxia, lapa, hipersensibilidade a frutos do mar.

Introduction

The common European limpet (*Patella vulgata*) belongs to the phylum Mollusca and the class Gastropoda. Its distribution is worldwide, being abundant in the northern coast of Spain, Japan, and warm maritime regions. In Portugal, it is most abundant along the coast of the Madeira archipelago, where it is commonly used for food. Allergic reactions to limpets are very rare. They have been described in the literature in Spain and Japan[1-4], but not Portugal. The cases described in Japan refer to the great keyhole limpet, which belongs to the genus *Fissurellidae*.[1]

Case report

A 44-year-old man had been a cook for 24 years, handling fish, mussels, oysters, and shrimp with no relevant personal history. He lived and worked as a cook in Madeira Island for 6 months in 2022.

He was referred for consultation because, while living on Madeira Island, he had an episode of generalized maculopapular rash with associated pruritus and angioedema of the lips, laryngeal tightness, and dyspnea 1 hour after ingesting 15 grilled limpets. He denied having any signs/symptoms in other systems. He denied exposure to drugs, exercise, infection, or dehydration. He went to the emergency department, where he received oral corticosteroids and antihistamines, which completely resolved the symptoms in about 6 hours. During the consultation, the emergency service charts were unavailable, as was information about the tryptase reaction. He denied any further ingestion or handling of limpets. He continues to eat shrimp, lobster, mussels, crab, octopus, and squid with no allergic reactions. He doesn't like snails and has never reacted to them.

In the immunoallergology study, skin prick tests (mm) were negative for shrimp, clams, squid, and

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octopus, and prick-prick was positive for both raw and cooked limpet (histamine 9, raw limpet 13, cooked limpet 11).

The total IgE assay was 90 kUA/L and the specific IgE assay (kUA/L) for keyhole limpet was positive (1.56). It was negative for octopus (0.01), squid (0.01), clam (0.01), anisakis (0.01), and snail (0.06). Basal tryptase dosage was within normal limits (5.15 ug/L).

For the keyhole limpet sensitization study, cooked and raw keyhole limpet extracts were prepared and the protein concentration in each extract was determined using the Bradford method. The results were 176.6 µg of protein/mg of lyophilized product in the cooked keyhole limpet extract and 430.1 µg of protein/mg of lyophilized product in the raw keyhole limpet extract.

The protein profile was studied using SDS-PAGE. A 20 µg protein sample from each of the two extracts was placed in gel. The most intense band in the cooked limpet extract was approximately 35 kDa. In the raw limpet extract, a greater number of bands were distributed along the entire lane, with more intense bands appearing at 27, 45 and 90 kDa. The results are shown in Figure 1.

The allergen profile was studied by immunoblot using 20 µg of protein from both keyhole limpet extracts and patient serum diluted 1:2. The patient's IgE recognized several bands in each extract. For cooked limpet extract, bands of 15, 20, 27, 34, 39 and 55 kDa were observed. For raw limpet extract, bands of 14, 24, 27, 32, 40 kDa and 2 bands above 100 kDa were observed. The results are shown in Figure 2.

All similar studies have linked limpet allergy with sensitization to *Dermatophagoides pteronyssinus*.[5,6] For this reason, an ImmunoCAP assay with mites and tropomyosin was performed. The results are shown in Table 1.

Once the patient's sensitization to mites was confirmed, a cross-reactivity study was performed using an inhibition immunoblot assay. Cooked and raw limpet extracts were inhibited by *D. pteronyssinus* extract. The cooked limpet extract was almost completely inhibited by the mite extract. However, when raw limpet extract was used in the solid phase, inhibition by *D. pteronyssinus* extract was very slight. The results are shown in Figure 3.

In the same assay, it was confirmed that several bands in *D. pteronyssinus* extract were recognized by the patient's IgE (Figure 3, lane 2).

Keyhole limpet food allergy was diagnosed, and given the clinical presentation, the patient did not take a challenge test with keyhole limpet. The patient was prescribed an adrenaline auto-injector, oral corticosteroids, and antihistamine for emergencies. The patient currently avoids eating limpets and has not come into contact with them while cooking food. He has been asymptomatic, with no need for emergency medication. The patient's case was reported in the Portuguese Catalog of Allergies and Adverse Reactions (CPARA).

Discussion

Shellfish intake has increased worldwide in recent years[7], and may be responsible for severe allergic reactions in sensitized individuals.[8,9] Worldwide, the prevalence of shellfish food allergy is estimated to be

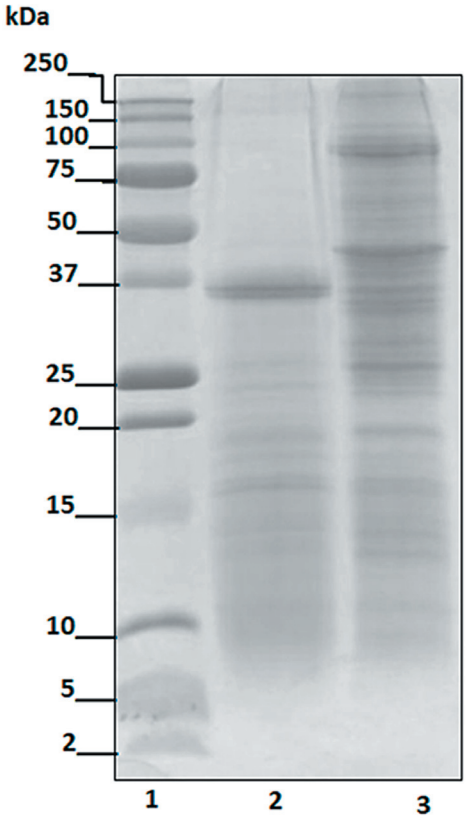

Figure 1
Protein profile (SDS-PAGE).
1 = Precision Plus molecular weight marker (Bio-Rad); 2 = boiled limpet (20 µg of protein); 3 = raw limpet (20 µg of protein).

3%.[1] However, few cases of IgE-mediated food allergy to limpets have been reported in the literature, even in regions where consumption is regular, such as the Madeira archipelago and the Canary Islands.

We have described the involvement of an IgE-mediated mechanism in an immediate reaction after limpet consumption. Unlike most reactions described in the literature, in which the main symptom after ingestion of keyhole limpet is exacerbated asthma[2,3,9], the present case involved an IgE-mediated anaphylaxis reaction. Keyhole limpet sensitization has been observed for both cooked and raw limpets, and in both cases is caused by various proteins ranging in size from 15 to over 100 kDa. Despite the scant information available in the literature on keyhole limpet allergy, several bands associated with sensitization to this food have been reported.[5,6] In these publications, keyhole limpet allergy was associated with dust mite cross-reactivity, so *D. pteronyssinus* sensitization was studied. We determined that the patient was indeed sensitized to dust mites. Positive allergenic activity for both raw and cooked limpets suggests that the implicated antigen(s) are temperature stable.

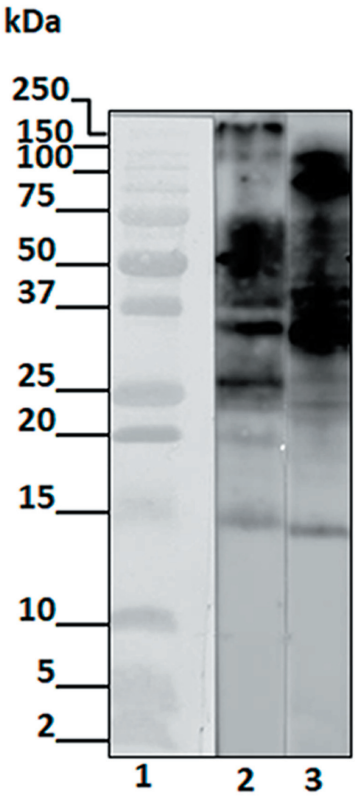

Figure 2
Allergen profile (Immunoblot)
1 = Precision Plus molecular weight marker (Bio-Rad); 2 = boiled limpet (20 µg of protein); 3 = raw limpet (20 µg of protein), serum diluted 1:2.

The patient tolerated other mollusks and crustaceans, which has been previously observed by Carrilo et al.[11], suggesting a different pattern of sensitization from that usually observed in shellfish food allergy, in which patients often present with concomitant sensitization to crustaceans and mollusks or sensitization between crustaceans.

Snails (terrestrial and marine) are also part of the gastropod class, and cross-reactivity between snails and house dust mites has been described.[10] To date, there is no description in the literature of cross-reactivity between snails and limpets, which could, however, be theoretically possible, since they belong to the same class. In our case, the patient does not eat snails, so it was not possible to assess a concomitant food allergy reaction to snails.

IgE-mediated shellfish allergy usually persists throughout life, and the only effective treatment is avoidance.[12,13] The patient continues to avoid limpets. Since he works as a cook and due to the

Table 1
Mite-specific IgE and tropomyosin

	D. pteronyssinus	*D. farinae*	Der p 10	Pen a 1
sIgE (kU/L)	15.2	8.85	0.01	0.01

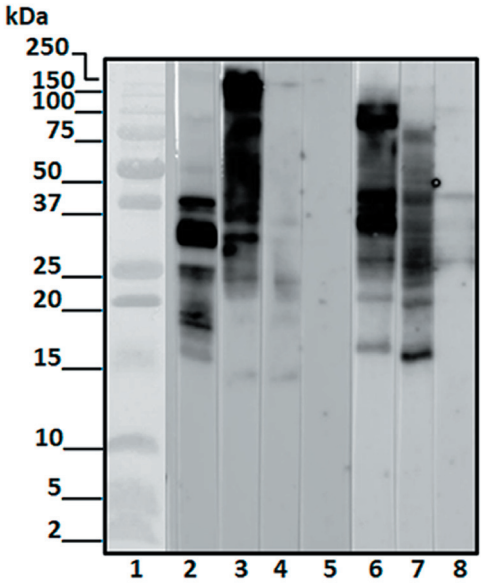

Figure 3

Cross-reactivity (Immunoblot inhibition)

M = Precision Plus molecular weight marker (Bio-Rad).

1 = *D. pteronyssinus* (20 µg protein); 2-4 = cooked limpet (20 µg protein); 6-8 = raw limpet (20 µg protein); 3 and 6 = no inhibition; 4 and 7 = inhibited with 100 µg of *D. pteronyssinus* protein; 5 = inhibited with 100 µg of cooked limpet protein; 6 = inhibited with 100 µg of raw keyhole limpet protein. In all bands, serum was diluted 1:2.

severity of the reaction, he was advised to also avoid handling limpets to prevent further reactions, whether by contact or inhalation. He was advised to wear personal protective equipment while working and carry an adrenaline auto-injector and other emergency medication with him. The patient's case has been reported in CPARA.

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