

Exercise-induced anaphylactic reaction to shellfish

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The syndrome of immediate type I food hypersensitivity, mediated by tissue-bound IgE antibody and mast cell histamine release, is well recorded in the medical literature. This case study represents a previously undescribed late food hypersensitivity, induced only by strenuous exercise. Identification of this new syndrome illustrates classical epidemiologic analysis, improves medical advice for the allergic and athletically inclined, and raises new questions in the areas of allergy and immunology.

The clinical syndrome of immediate type I food hypersensitivity to shellfish is well described in the medical literature.¹⁻² The clinical presentation can include urticaria, angioedema, hives, pruritus, conjunctivitis, wheezing, and hypotension. The allergic event is mediated by IgE antibody activity and mediator release from mast cells. Allergic manifestations usually appear rapidly after ingestion of the known antigenic agent. The present case illustrates a previously undescribed late reaction to shellfish precipitated only by strenuous exercise.

CASE REPORT

A 31-year-old vigorous male long-distance runner (50 to 130 km/wk with races from 5,000 m to marathon distance) was initially seen because of approximately 10 bouts over 3 yr of transient facial flushing and edema, diffuse urticaria, and intense pruritus occurring immediately following exercise. The patient had an atopic history with an allergy to penicillin and a history of seasonal hay fever. Shellfish were a staple of his diet and routinely caused no systemic allergic reaction. Two bouts of the postexercise urticaria within 4 days with almost complete upper airway closure, requiring epinephrine and antihistamines, brought him to our attention.

A detailed epidemiologic history including dietary intake revealed shellfish intake 5 and 24 hr prior to the two exercise-related events. Eight boiled shrimp with ketchup preceded the first bout of urticaria and 1 can (100 gm) of smoked oysters was eaten prior to the second reaction. Similar data were not available for previous episodes. Two runs of 10 k on intervening days between the bouts of urticaria were not preceded by shellfish and did not result in allergic reaction.

The patient initially avoided shellfish due to strong suspicion generated after first medical evaluation. Because of the near total airway closure during the reactions and the runner's strong desire to continue his avocation, D. S. P. accompanied the patient on all workouts during the subsequent 30-day period, carrying appropriate epinephrine and antihistamines. At least 30 separate runs from 10 to 15 k in distance over the 30-day period did not induce an allergic episode. However, an inadvertent self-challenge with shellfish (100 gm smoked oysters) 20 hr prior to running 1 month later resulted in the described reaction immediately following exercise. The young athlete now assiduously avoids shellfish and has had no further reactions.

Cutaneous allergy testing showed positive prick tests to clams, oysters, shrimp, crabs (all 1/20 w/v), peanuts (1/20 w/v), trees, grass, and weeds (all 20,000 protein nitrogen units) (Greer Labs., Lenoir, N. C.).

DISCUSSION

The patient developed severe systemic allergic reactions which were induced by the ingestion of a specific food (shellfish) followed by exercise. Although the patient has specific IgE to the food, systemic allergic reactions were not produced by ingestion alone. Likewise, no reaction occurred following prolonged exercise without prior ingestion of the allergen. In addition, since the reactions occurred in the

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winter as well as the fall seasons, the potentiation of the reaction by inhalants to which the patient is very sensitive is less likely.

The statistical association between the ingestion of the shellfish and a reaction following exercise is very strong ($p < 0.001$, Fisher's exact probability test). Only 3 of more than 30 runs over a period of 1 month resulted in the described reaction, these 3 runs being the only ones preceded by ingestion of shellfish. The mechanisms responsible for this type of exercise-induced reaction are unclear. The exercise may lower the threshold for mediator release from mast cells and basophils or increase delivery of antigen to these sites.

The new popularity of and interest in running has already led to the consideration of its related medical morbidity and mortality.³⁻⁷ This case report clearly

adds to that spectrum, improves medical counsel to the allergic and athletically inclined, and raises new questions in the areas of allergy and immunology.

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