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Letter

Novel case of anaphylaxis to sturgeon fish

Introduction

Sturgeon fish belong to the *Acipenseridae* family and are found in lakes, rivers, and coastlines of North America, Europe, and Asia. These fish have lifespans up to 55 years in males and 150 years in females, with fossils dating their existence back to approximately 200 million years. In addition, their weights vary on average between 200 and 4,400 pounds, and their lengths are commonly 7 to 12 feet, which has led some to speculate that these fish are the original "Loch Ness Monster." They are prized for their flesh as a source of food, and various parts are also used in cosmetics, ornaments, isinglass, and leather. However, they are most valued for their unfertilized roe as caviar, a gourmet delicacy that has led to overfishing and their classification as a critically endangered group of species. Prior case reports have been published of anaphylaxis to Beluga caviar,[1,2] but despite the worldwide consumption of these fish to the point of near extinction, this is the first reported case of sturgeon flesh anaphylaxis.

A 17-year-old girl presented to an allergy and asthma clinic approximately 1 month after experiencing throat pain and closing, dysphagia, and dyspnea immediately after ingestion of a cornmeal breaded sturgeon fish. She also developed diffuse urticaria and angioedema of her lips, tongue, nose, and eyes. She was evaluated in the emergency room and treated with epinephrine, intravenous steroids, and diphenhydramine. Symptoms resolved after 30 minutes. She subsequently avoided all shellfish and fish. Of note, she has eaten sturgeon fish, shellfish, and other fish without problems in the past.

Her medical history was significant for eczema controlled with moisturizers. Her family history was significant for allergic rhinitis, eczema, and recurrent urticaria with her sister and a flying hymenoptera allergy with her brother.

Results of her physical examination were normal without signs or symptoms of atopy. Skin prick testing was positive to fresh frozen sturgeon fish with a 16-mm wheal and surrounding flare. Eighteen other fish and shellfish extracts were tested, of which only trout was positive, with a 6-mm wheal and surrounding flare. Skin prick testing to corn was negative.

Further evaluation with an immunoglobulin E (IgE) immunoblot was performed using the patient's serum against sturgeon, trout, salmon, and cod proteins in an attempt to isolate the allergenic sturgeon protein. Trout was selected because she had a positive skin test to trout. Salmon was included because the patient demonstrated a small 2-mm wheal and flare with skin testing. Finally, cod fish was included because it is one of the most extensively studied fish. A known fish-allergic patient's serum served as positive control, and a pooled cord blood sample as negative control.

The IgE immunoblot identified faint patient protein binding to sturgeon fish at 55, 65, and 100 kDa. The patient also had binding to trout at 35, 55, and 65 kDa, and faint binding to cod at 100 and 150 kDa, but no binding to salmon. The fish-allergic serum (positive control) bound to sturgeon fish, salmon, and cod at 75 kDa, and to trout at 35 and 55 kDa. The pooled cord blood serum (negative control) did not bind to any fish protein. Because the patient's sturgeon protein bands were faint, an enzyme-linked immunosorbent assay with inhibition was also performed using the patient's serum. This confirmed the presence of specific IgE to sturgeon fish (Fig 1).

The patient was instructed to avoid sturgeon fish and Beluga caviar, which is derived from sturgeon fish. This recommendation was made because although there were 2 cases of allergic reactions to fish roe without concomitant fish meat allergy reported,[3] no reports or studies have suggested that the reverse also may be possible (ie, fish meat allergy without fish roe allergy). Avoidance to trout and its roe was recommended as well.

The various proteins bound by the patient to the sturgeon fish meat need to be further characterized. The most common fish protein allergen is parvalbumin, but the weight typically only ranges from 11 to 45 kDa,[4] which would be inconsistent with the proteins bound by this patient. Other possibilities include formation of parvalbumin polymers, which has been suggested for snapper fish allergens,[5] derivatives of vitellogenin that have been identified in Beluga caviar,[2] or unique sturgeon flesh neoallergens.

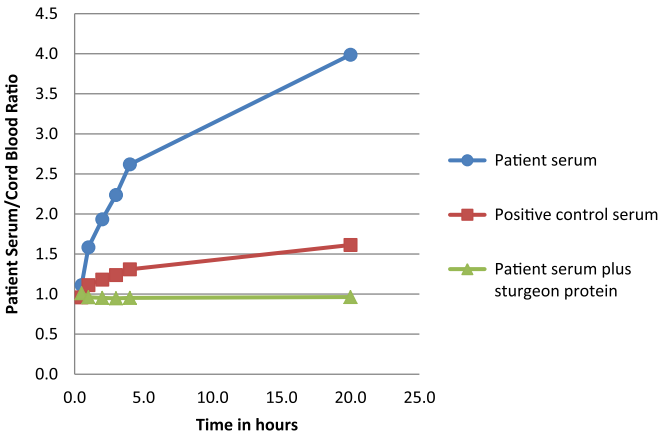

Figure 1. Enzyme-linked immunosorbent assay results indicating that the patient's serum is positive to sturgeon protein, with a ratio over cord blood serum (negative control) of 4 at 20 hours, and was completely inhibited by sturgeon protein.

Disclosures: Authors have nothing to disclose.

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Concordantly, trout (35, 55, 65 kDa) and cod (100, 150 kDa) proteins that were bound have yet to be identified. Finally, this patient's binding patterns indicate that these fish may have cross-reactive fish proteins—sturgeon and trout at 55 and 65 kDa and sturgeon and cod at 100 kDa.

To our knowledge, this is the first report of sturgeon flesh anaphylaxis. Further research is needed to clarify the specific protein allergens that have been identified.

Sandy K. Yip, MD[*]
Robert A. Gomez, BS[*]
Kevin M. White, MD[*]
Ronald W. England, MD[†]
[*]*Department of Allergy/Immunology*
Wilford Hall Ambulatory Surgical Center
San Antonio, TX

[†]*Spokane Allergy and Asthma Clinic*
Spokane, WA
sandy.yip@us.af.mil

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