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Letter to the Editor

Immediate anaphylaxis due to beef intestine following tick bites

Dear Editor,

Red meat allergy induces delayed anaphylaxis 3–6 h after ingestion of mammalian meat.¹ Such delayed anaphylaxis is associated with immunoglobulin E (IgE) antibodies to galactose- α -1,3-galactose (α -Gal), a carbohydrate epitope contained in both mammalian meat and tick saliva.^{1–3} In addition, it has been reported that Japanese patients with red meat allergy often experience an allergic reaction after ingesting flounder roe.⁴

By contrast, an immediate reaction to mammalian organ meat in patients with red meat allergy is not well-reported in the literature. Here we report a case of red meat allergy in which the individual received tick bites followed by episodes of immediate anaphylaxis that developed after ingesting beef intestine and flounder roe.

Case report

An 80-year-old man was admitted to the emergency department in our hospital with urticaria, dyspnea, and wheeze immediately after ingesting boiled flounder roe. His vital signs were as follows: heart rate, 102 beats/min; blood pressure, 71/62 mmHg; respirations, 25/min, and SpO₂, 94% on room air. We diagnosed anaphylactic shock and treated him with intramuscular adrenaline, oxygen, steroids, and crystalloid boluses. He had developed tick-transmitted Japanese spotted fever 6 months prior to this episode. Although he had no history of allergic diseases before the tick bites, he had experienced unexplained episodes of anaphylaxis twice during this 6-month period. He was referred to our department for further investigation of repeated anaphylaxis. A detailed interview revealed that he had consumed beef intestine stew and alcohol about 1 h before both episodes of urticaria and wheezing dyspnea. His levels of specific IgE antibodies (ImmunoCAP; Thermo Fisher Scientific, Waltham, MA, USA) against beef, pork, chicken, and flounder were 35.1 U/mL (class 4), 12.2 U/mL (class 3), 0.01 U/mL (class 0), and 0.02 U/mL (class 0), respectively. In addition, the concentration of IgE antibody against α -Gal was 78.5 U/mL (class 5). We performed a skin prick test on the volar side of the forearm with a bifurcated needle (ALO bifurcated needle; TMI, Tokyo, Japan). Positive control (10 mg/mL of dihydrochloride histamine) and negative control (0.9% saline) showed wheal 8 mm and 2 mm, respectively. A positive response was defined as a wheal size equal to or greater than half the diameter seen for the positive control. Prick-to-prick tests with boiled flounder roe yielded positive results (wheal diameter 7 mm), while raw and boiled flounder meat as well as raw flounder roe yielded negative

results (Fig. 1). We diagnosed α -Gal and flounder roe allergy. The results strongly suggested that the tick bites had led to sensitization to the α -Gal present in the tick saliva, accompanied by the development of allergy for red meat containing α -Gal on glycoproteins or glycolipids. The patient reported no further episodes since adhering to the complete avoidance of mammalian meat, organ meat, and flounder roe.

Discussion

We reported a rare case of immediate anaphylaxis following the consumption of beef intestine and flounder roe after tick bites. Anaphylaxis is a fatal systemic reaction involving the sudden release of mast cell-derived mediators. Based on the literature, the median time for anaphylaxis after exposure to a food allergen is 10 min.⁵ By contrast, patients with red meat allergy often experience delayed symptoms of urticaria or anaphylaxis 3–6 h after ingesting mammalian meat. The delayed response to mammalian meat is thought to underlie the delayed arrival of antigens in circulation.⁶

In the case of our patient, the symptoms appeared about only 1 h after ingesting beef intestine. This might be explained by two reasons. First, alcohol may enhance allergic reactions. A recent study reported that cofactors such as alcohol and exercise can reduce the initiation time of allergic reactions after ingesting mammalian organ meat.⁷ Second, the ingestion of mammalian organ meat may induce more severe and rapid reactions compared with mammalian meat. It has been proven that α -Gal epitope is also present in the porcine small intestinal submucosa.⁸ Some studies have reported that the ingestion of porcine kidney by patients with red meat allergy induces more severe and rapid reactions at about 2 h rather than 4 h. This severity might be responsible for the elevated levels of α -Gal epitope in the kidney.^{7,9} In addition, a case of anaphylaxis resulting from the ingestion of porcine gut and kidney with tolerance to pork meat has been described.¹⁰ However, whether beef intestine contains high levels of α -Gal epitope remains unknown.

Our patient also experienced anaphylaxis after ingesting flounder roe. A Japanese review revealed that 15 of 20 patients with red meat allergy also had flounder roe allergy.⁴ Flounder roe allergy is considered to be caused by cross-reactivity with mammalian meat; however, the association with α -Gal remains unclear.⁴

The findings in the case suggest that when encountering unexplained anaphylaxis following tick bites, red meat–flounder roe allergy syndrome should be considered. In patients with red meat allergy, the ingestion of mammalian organ meat accompanied by alcohol may induce more severe and rapid reactions compared with delayed anaphylaxis due to the consumption of mammalian meat.

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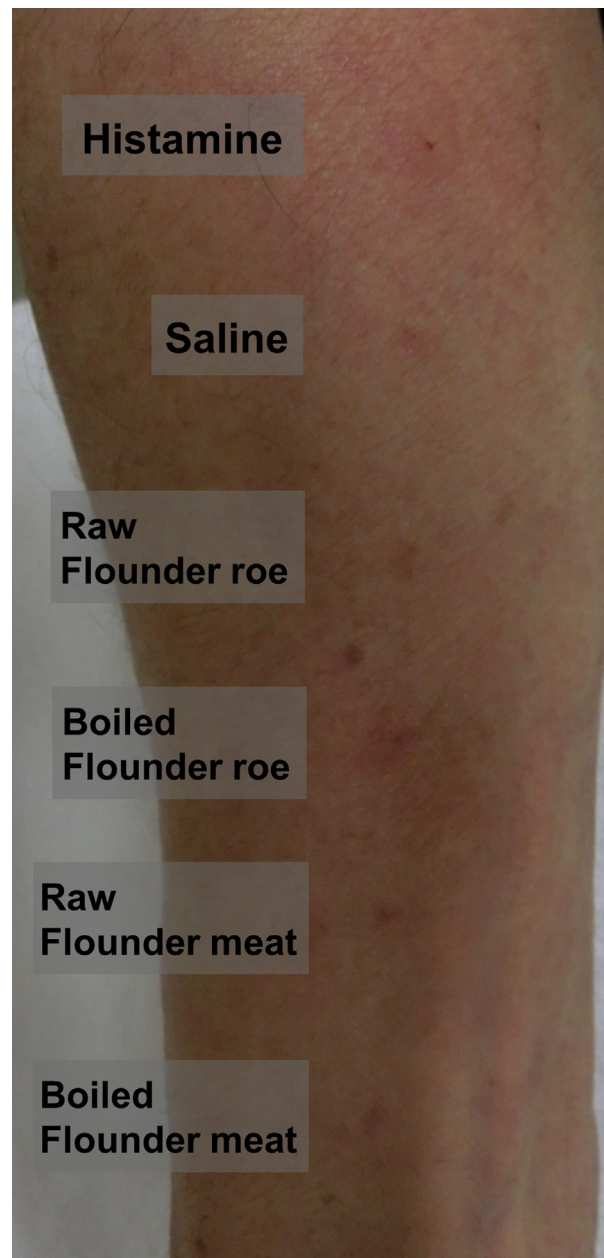


Fig. 1. Prick-to-prick tests with boiled flounder roe yielded positive results, while raw and boiled flounder meat as well as raw flounder roe yielded negative results.

Conflict of interest

The authors have no conflict of interest to declare.

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