

Allergic reaction or food poisoning? The history holds the clue

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TEACHING POINTS

- Scombrototoxic fish poisoning likely occurs more often than is documented or reported to the CDC because of the similarity of symptoms to an allergic reaction, which is not usually reported.
- The fish should be cooled quickly after the catch, and refrigeration at a temperature of less than 40°F should be maintained at all times.
- Fish containing high levels of histamine may not appear spoiled, although the consumer may notice a peppery taste. Cooking does not inactivate the toxin.
- An episode of histamine poisoning does not preclude ingestion of the same type of seafood in the future.

CASE

Patient 1 A 20-year-old female presented to the emergency department (ED) with sudden onset of generalized flushing, a sensation of generalized heat and itching, headache, tightness in the throat, and extreme anxiety; she denied chest pain. Approximately 20 minutes prior to the onset of symptoms, the patient had eaten a tuna burger that was prepared by her father, who was a chef. She stated that the tuna used in the burger was of sushi quality (ie, not canned) and that she had eaten this type of -seafood in the past, without adverse reaction. The patient denied any history of food or medication allergies. Her medical history was unremarkable, and she was taking no medications.

Initial vital signs were as follows: temperature, 97.4°F; heart rate, 150 beats per minute; respiratory rate, 24 breaths per minute; BP, 68/46 mm Hg; oxygen saturation, 100% on room air. The patient's anxiety appeared to be escalating quickly. An IV line was inserted, and an infusion of 1,000 cc normal saline was initiated and run wide open. The cardiac monitor revealed supraventricular tachycardia (SVT) at a heart rate of 165 beats per minute. Diphenhydramine 25 mg was administered via IV push. Administration of epinephrine was considered but withheld because of the patient's rapid heart rate.

Within 10 minutes, the patient's vital signs had improved: heart rate, 138 beats per minute; respiration rate, 22 breaths per minute; BP, 133/78 mm Hg. The patient continued to express feelings of anxiety and complained of headache, but she appeared more comfortable.

Patient 2 Fifteen minutes after the first patient's arrival, her twin sister arrived in the ED, accompanied by their mother and complaining of similar symptoms. The second patient denied anxiety but complained of headache and a "racing heart." She, too, had eaten a tuna burger and experienced symptoms that began about 20 to 30 minutes after ingestion. The mother reported that the patients' father had ingested a burger as well, but to her knowledge, he was asymptomatic. The second patient had no known food or drug allergies. She had also eaten tuna on numerous occasions in the past, without adverse reaction.

Initial vital signs were as follows: temperature, 98.7°F; heart rate, 114 beats per minute; respiration rate, 22 breaths per minute; BP, 130/71 mm Hg; oxygen saturation, 99% on room air. Treatment was similar to that of the first patient. An IV line was inserted, and 1,000 cc of normal saline was initiated and run wide open. The cardiac monitor initially revealed sinus tachycardia at a rate of 120 beats per minute. Diphenhydramine 25 mg was administered via IV push.

Within 20 minutes, the second patient's vital signs had improved: heart rate, 101 beats per minute; respiration rate, 18 breaths per minute; BP 115/60 mm Hg.

Differential diagnosis Based on the women's symptoms, the differential diagnosis included acute allergic reaction, food poisoning, niacinlike reaction, and migraine or cluster headache. Given the patients' history of ingesting tuna, a diagnosis of scombroid fish poisoning was made.

DISCUSSION

Scombroid fish poisoning, more commonly known as histamine poisoning, is associated with eating dark-fleshed finfish, such as marine tuna and mackerel, but nonscombroid fish—for example, mahimahi and sardines—have also been implicated. Predy and colleagues have described an incident of histamine poisoning after the ingestion of canned tuna.¹ The fish most commonly associated with this illness are members of the Scombridae and Scomberesocidae families: thus the name scombroid poisoning.¹ The illness is considered to be food-related, not an allergic reaction. Scombrototoxic fish poisoning likely occurs more often than is documented or reported to the CDC because of the similarity of symptoms to an allergic reaction, which would not ordinarily be reported.

Histamine poisoning may occur from consuming dark-fleshed fish that has not been maintained in a cooled environment after thawing or has been improperly handled after catching. The most effective way to reduce the risk of histamine food poisoning is to keep the fish properly cool at all times, beginning at the moment of the catch until consumption. The fish should be cooled quickly after the catch and refrigeration at a temperature of less than 40°F should be maintained at all times.² When the fish is allowed to warm to temperatures above 45°F for several hours, the risk of histamine metabolism is increased. Histamine is produced in the muscle of these dark-fleshed fish after death through bacterial decarboxylation of histidine.² This chemical process usually takes some time; therefore, the longer the fish tissue remains improperly chilled, the greater the risk of increasing levels of histamine. Fish containing high levels of histamine do not necessarily appear spoiled, although the consumer may notice a peppery taste. Cooking does not inactivate the toxin.³

The ingestion of large quantities of histamine causes symptoms similar to an allergic reaction; generalized blanching erythema, tachycardia, and hypotension.² The flushing associated with histamine poisoning characteristically involves the trunk, face and neck, and upper arms, and it has sharply demarcated edges like that of a sunburn.³ Patients often present with complaints of headache, palpitations, a sense of anxiety, and nausea. Wheezing is usually not appreciated except in histamine-sensitive asthmatics.² The symptoms of histamine ingestion through spoiled fish are typically more severe than from ingestion of pure histamine, although there is no scientific explanation for this occurrence.⁴

Onset Symptoms of histamine poisoning occur from as soon as 10 minutes up to a few hours after eating the fish and can persist for as long as 24 hours after ingestion.^{2,5} The intensity of symptoms is proportionate to the amount of scombrototoxic fish eaten.² Proximity of the portion of fish eaten to the

outer surface will also affect the intensity of the symptoms. This may explain the difference in symptom intensity demonstrated by the twins and the report that the father was asymptomatic.

People presenting to an ED with symptoms of an acute allergic reaction should be questioned about recent food ingestion. The diagnosis of histamine poisoning is usually based on a complete food history as well as ruling out other causes of the symptoms. Histamine poisoning is diagnosed clinically, as plasma histamine concentrations are often not available or practical in most hospital laboratories to confirm the diagnosis.¹

Incidence of poisoning In 2006, a Surveillance Summary issued by the CDC indicated that during the years between 1998 and 2002, 463 individual cases of histamine-related foodborne illnesses were reported; no cases resulted in death. During the same time frame, 4,854 cases of foodborne illness resulting from ingestion of the bacterium *Escherichia coli* resulted in four deaths. *Salmonella*, the most common bacterial source of foodborne-related illness reported between 1998 and 2002, was the cause of 16,821 individual cases and 20 deaths. The highest incidence of death due to a foodborne illness (43%) was attributed to the bacterium *Listeria monocytogenes*, although only 256 cases were reported. Of all the reported cases of foodborne illness with known etiologies, almost 55% had a bacterial origin (*salmonella* or *E coli*) compared with fewer than 1% that could be attributed to chemical sources, such as histamine toxin. The remaining reported cases of foodborne illness could be traced back to parasitic (*Giardia intestinalis*) or viral (norovirus, hepatitis A) sources. Of note, 46% of all reported cases of foodborne illness could not be traced to a specific etiology.⁶

A number of factors may lead to the underreporting of histamine poisoning as a foodborne illness. The symptoms resulting from histamine poisoning differ from those more commonly associated with foodborne illness (ie, ingesting foods infected with bacteria such as *salmonella* or *shigella*), which may deceive the treating practitioner into believing the symptoms are allergic in origin. The symptomatology and short time to onset of symptoms seen in histamine poisoning can mimic an allergic reaction. In addition, histamine poisoning responds well to the standard treatment for an allergic reaction (histamine blockers). Some symptoms that are not ordinarily associated with an allergic reaction include a burning sensation in the mouth, tingling of the skin, and headache.⁵ Because the symptoms of histamine poisoning can be mild, self-limiting, and short-lived, some afflicted persons will not seek medical treatment. A patient who presents with the most common symptoms of histamine poisoning (skin flushing, tachycardia) can easily be misdiagnosed as having an allergic reaction. Therefore, the assumption is that many cases of histamine poisoning are being misdiagnosed.

Treatment Histamine poisoning is usually self-limiting, but the symptoms are often so uncomfortable or alarming that patients present to an ED. Treatment should include a detailed history; cardiac monitoring; and administration of an antihistamine, such as diphenhydramine (25-50 mg by mouth, IV, or IM). Additional treatment or monitoring (ie, bronchodilators, oxygen administration) should be symptom-driven. An H₂ antihistamine (such as cimetidine 300 mg by mouth or IV) may be administered concurrently with a H₁ blocker. Because the mediators released during a true allergic reaction are not present in histamine poisoning, epinephrine is rarely indicated.² The patient can probably be discharged with instructions to take H₁ and H₂ blockers for the next 3 to 5 days. The local public health office should be notified if the source of the contaminated fish was public (such as a restaurant). Patients should be instructed to avoid consumption of dark-fleshed fish if they suspect it was improperly handled or if they notice that it has a peppery taste. Because the histamine reaction is nonallergic, the consumption of similar fish in the future need not be avoided.³

Distinguishing between a diagnosis of scombroid or histamine poisoning and allergic reaction is important because the outpatient treatment and counseling differ. Practitioners should question all patients suspected of having food poisoning versus allergic reaction about other symptoms that may be subtle and therefore ignored by the patient. Whereas allergic reactions are treated as symptoms dictate, histamine poisoning are treated with oral H1 and H2 blockers for at least 3 days regardless of any resolution of symptoms. If a patient has a history of ingesting a type of fish documented as being a culprit in histamine poisoning, the assumption must be that the resultant reaction is not allergic in nature. The diagnosis of scombroid or histamine food poisoning should prompt the practitioner to alert the local health department or CDC so that it can follow up with an investigation. The patient should be counseled on the proper care and handling of fresh fish. Educational information for the patient should include instructions to maintain the proper temperature of fish and to avoid thawing frozen fish at room temperature. The patient should also be informed that an episode of histamine poisoning does not preclude ingestion of the same type of seafood in the future. jaapa

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