

# A Case of Salmonella Gastroenteritis Following Ingestion of Raw Venison Sashimi

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## Abstract

An interesting case of gastroenteritis due to *Salmonella* Birkenhead following ingestion of raw venison sashimi is described. A 65-year-old man presented with diarrhea, vomiting, and fever. On exam he was hypotensive, tachycardic, with evidence of severe dehydration following ingestion of raw venison sashimi produced with game meat hunted on the Hawaiian island of Lana'i. He responded rapidly to vigorous volume resuscitation, and stool cultures later were positive for *Salmonella* Birkenhead. Non-typhoidal *Salmonella* is the most frequently identified cause of foodborne illness in the United States. Clinicians in the state of Hawai'i should be alert and aware of the potential for the local deer population to be an unusual source of foodborne illness, especially given the prevalence of consumption of raw foods in the local cuisine.

## Introduction

An interesting case of *Salmonella* gastroenteritis following ingestion of some unusual local cuisine is presented. Our patient consumed "venison sashimi" from deer hunted on the island of Lana'i.

## Case Report

A 65-year-old Caucasian man from Honolulu presented to the emergency department for evaluation of diarrhea and palpitations. He and his wife had become ill four days previously, with diarrhea and vomiting. His wife's symptoms resolved within 24 hours but his diarrhea persisted and he continued to experience approximately eight watery and non-bloody bowel movements per day as well as new palpitations. He reported fever to 103.1°F at onset of symptoms four days before, but no fever since. He denied recent travel outside of the state of Hawai'i, but several days ago he had traveled from O'ahu to the island of Lana'i where he participated in his family's annual deer hunt. Afterward, he had consumed deer meat in the form of raw venison sashimi, as he and his wife had done in the past without incident. The patient reports he consumed a larger quantity of raw venison sashimi than his wife on this occasion.

His past medical history was notable for hypothyroidism, vitamin B12 deficiency, and Wolff Parkinson White syndrome diagnosed at age 16 but without any previous episodes of arrhythmia. Medications included oral cyanocobalamin, levothyroxine, and occasional naproxen sodium. He no longer smokes but has a 75 pack-year history of tobacco, and drinks wine on occasion.

On presentation to the ED our patient was hypotensive and tachycardic, with dry mucous membranes and prominent skin tenting. However, he was afebrile with normal mentation and had a normal abdominal exam. Electrocardiogram revealed sinus tachycardia with Wolf Parkinson White morphology and occasional premature ventricular complexes. Laboratory evaluation revealed hyponatremic hypochloremic metabolic acidosis

with an anion gap of 20 and acute kidney injury. He responded rapidly to vigorous volume resuscitation, but later developed a stable supraventricular tachycardia which quickly resolved with a combination of vagal maneuvers and amiodarone. His persistent diarrhea was treated with ciprofloxacin and metronidazole, given his dramatic presentation and reported history of raw venison ingestion. Blood cultures revealed no growth but stool cultures later were positive for *Salmonella* Birkenhead. He was ultimately discharged in stable condition with complete resolution of his symptoms.

## Discussion

There are over one million cases per year of Non-typhoidal *Salmonella* in the United States, making it the most frequently identified cause of foodborne illness in the country. Although typical gastroenteritis is self-limited, many cases are sufficiently severe to cause hospitalization or even death. Non-typhoidal *Salmonella* is responsible for nearly one third of deaths associated with foodborne illness in this country annually. Although outbreaks can occur, sporadic cases account for the majority of occurrences.<sup>1</sup> The Centers for Disease Control and Prevention has previously acknowledged regional differences in the prevalence of various *Salmonella* serotypes.<sup>2</sup> The particular serotype identified in our case, *Salmonella* Birkenhead, was first identified in a series of patients in England in 1948, and since its discovery has been known to cause typical gastroenteritis with diarrhea, vomiting, and fever.<sup>3</sup>

It is known that deer are among the many species of wild animals that can shed *Salmonella* in their feces.<sup>4</sup> This can lead to human infection in those who process, prepare, or consume venison.<sup>4</sup> In Hawai'i, it has long been known that certain animals and animal products have a higher propensity to carry *Salmonella*, particularly Hawaiian hogs and chickens.<sup>5</sup> However, a search of the literature did not find data to implicate the local deer population as a source for foodborne illness. Many clinicians in Hawai'i are unaware of the large populations of free-ranging deer on the outer Hawaiian islands. This is significant because deer are implicated as vectors of multiple foodborne pathogens, particularly *Escherichia coli* O157, *Campylobacter jejuni*, and *Salmonella* spp, although prevalence varies by region.<sup>4,6,7</sup>

Since the state of Hawai'i is geographically isolated, it is important to identify potential, unrecognized sources of *Salmonella* infections and it is important for clinicians to be aware of potential reservoirs and vehicles for transmission of *Salmonella* to patients in the area. The temporal relationship between ingestion and onset of clinical symptoms implicate raw venison as the most likely source of *Salmonella* gastroenteritis in our patient.

The ethnic and cultural diversity of Hawai'i affords a cuisine with ample opportunities to eat raw or undercooked food, including sushi, ceviche, oysters, and clams. Game meat, including deer on Lana'i, is readily available to hunters. Clinicians in Hawai'i should remain alert and aware of the potential local sources of foodborne illness. The deer population of Hawai'i can potentially harbor foodborne pathogens. All persons should be reminded to thoroughly cook game meat and always adhere to safe food handling practices.

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