

Acute gastroenterocolitis caused by *Salmonella* Chester

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Abstract

Turtles are common pets and represent a known reservoir for salmonellosis. There are few epidemic outbreaks of salmonellosis linked to ingestion of undercooked turtle meat described in the literature. A few cases of pet turtle borne infection and infection due to aquarium water contamination have been described. We present two female patients hospitalized with acute gastroenterocolitis caused by *Salmonella* Chester, and give an epidemiological report of the events related to the infection outbreak. The infection was transmitted from the water of a private aquarium housing two pet turtles.

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1. Introduction

Turtles are popular pets, widely accessible in pet stores. Reptiles are common salmonellosis reservoir, because they carry *Salmonella* spp. as part of commensal flora in their intestines. *Salmonella* spp. were found in 50–90 % of their faeces samples (1,2). Children are often infected because they spend a lot of time in close contact with their pets (3).

The paper describes two patients (Patients 1 and 2) who were hospitalized with acute gastroenterocolitis caused by *Salmonella* Chester transferred from the water contaminated by yellow-necked turtles. An epidemiological report on the events associated with the infection is given.

2. Case reports

2.1. Group 1

A 55-yearold female with the diagnosis of Raynaud's phenomenon, hiatal hernia, reflux oesophagitis type A, and mixed connective tissue disease treated with methylprednisolone, (Patient 1) was hospitalized with a 5-day history of vomiting and diarrhoea. She passed at least ten green watery stools a day. She had diffuse abdominal pain relieved by defecation. She had a headache and a temperature of up to do 38 °C. Three to four days before the outbreak of her symptoms her granddaughter fell ill with vomiting and diarrhoea. The patient was febrile (37,9 °C) and tachy-

cardic; on palpation her abdomen was painful in the lower quadrants. Laboratory measurements showed high levels of C-reactive protein and procalcitonin without leucocytosis or lactate elevation. Laboratory criteria for dehydration with impaired renal function were present. Abdominal ultrasound showed signs of gastroenterocolitis with a thickened hypoechoic colonic wall, especially in the right hemicolon. During the first days of hospital stay she was febrile (temperature of up to 39,6 °C) and had low blood pressure (around 90/60 mmHg). Low blood pressure returned to normal after parenteral hydration. The patient complained of moderate headache. After four days of antibiotic treatment with ciprofloxacin and azithromycin her inflammatory markers levels were normalized. She received antibiotics for ten days. After parenteral hydration her renal function returned to normal. Haemocultures remained sterile. *Salmonella* Chester, sensitive to all the tested antibiotics (ampicillin, cefotaxime, ceftriaxone, ciprofloxacin, trimethoprim with sulfamethoxazole) was isolated from stool samples. Before bacteria isolation, there was suspicion of an infectious disease outbreak because several family members experienced the same symptoms. On reviewing the patient's history we connected the outbreak of symptoms with exposure to new family pets- two yellow-necked turtles. The Regional Unit of the National Institute of Public Health was notified about the outbreak, and epidemiological monitoring was performed.

2.2. Group 2

A 4.5-year-old female (Patient 2) was admitted to hospital with a 4-day history of abdominal pain, diarrhoea and high temperature. One day before the

onset of diarrhoea she vomited 10 to 15 times, and then the vomiting stopped. She had up to 20 watery stools without traces of blood a day. Her body weight decreased by 0.5 kg per day. She had a temperature of up to 39.5 °C. The day before hospitalization she refused food and water intake. Her younger sister had similar symptoms, which lasted for two days; her grandmother was hospitalized for the same symptoms (Patient 1). Her mother presented with vomiting for two days; her father was nauseous but had no other symptoms. On examination the girl showed no clinical signs of dehydration; she had fever of 38.8 °C, tachycardia, and diffuse abdominal pain on palpation. Laboratory tests showed elevated C-reactive protein, hypokalaemia and dehydration. She received parenteral hydration with potassium supplements; since day two of hospital stay her oral water intake has been sufficient. During her stay in the hospital we once noticed a small amount of blood in her stool. Her haemocultures remained sterile. *Salmonella* Chester, sensitive to all the tested antibiotics (ampicillin, cefotaxime, ceftriaxone, ciprofloxacin, trimethoprim with sulfamethoxazole) was isolated from stool samples. The patient was discharged after eight days of hospitalization. She had fever for 15 days and diarrhoea for 16 days. *Salmonella* Chester persisted in stool samples of our patient and her younger sister after three and six weeks, respectively. Other family members had negative stool samples at that time. Stool samples of the affected girls were negative after nine weeks.

3. Epidemiological report

After the notification of the suspected infectious disease outbreak in a family, we performed an epidemiological survey following the infectious bowel

diseases protocol. Six family members, five females and one male, aged two to 56 years were admitted to hospital. Five presented with the signs of gastroenterocolitis (two sisters, the mother and the grandmother). Two of them, i.e. the grandmother and the granddaughter were hospitalized.

The survey showed that the affected persons lived in the same house with separate and occasionally common household. None of them worked in food industry, health, school or kindergarten services.

A few days before the onset of symptoms they had bought two yellow-necked turtles in a pet store. They had no direct contact with turtles except when cleaning the aquarium. In view of the time course and connection between symptoms and new pets there was a high suspicion of animal-human disease transmission. We consulted the Administration of the Republic of Slovenia for Food Safety, Veterinary Sector and Plant Protection (UVHVVR) and a local veterinary station.

The local veterinarian checked the health status of turtles and sent the turtle cloaca for further testing to the Leipzig IDEXX laboratory. After receiving negative cloaca results, samples of aquarium water were sent for analysis. Water samples were positive for *Salmonella* Chester.

UVHVVR contacted the turtle distributor and warned them about possible animal-human disease transmission. Data from pet shop showed that four yellow-necked turtles of the *Testudo* species had been delivered to the shop in one shipment. Two buyers bought two turtles each. One buyer was the member of the diseased family. Another buyer was contacted and alerted, but never responded. Cleaning and disinfection of

the pet shop was performed; none of the employees fell ill.

Three of the persons with symptoms (Patients 1 and 2 and the younger sister of Patient 2) had confirmed *Salmonella* Chester infection.

4. Discussion

The literature mentions turtle meat as a reservoir for *Salmonella* infections. During reptile breeding their meat becomes contaminated. It depends on the accommodation and feeding hygiene conditions. The quality of water in contact with the aquatic animal is also important (2). In the 1970s precautions were taken in several countries around the world to reduce the transmission of turtle-borne infections; from banning the sale of turtles as pets to testing turtles for the presence of bacterial colonisation (4).

Several examples of minor epidemic outbreaks have been described in connection to consuming raw or poorly heat-treated meat and offal of turtles (2). An example of the transmission of *Salmonella* infection from the turtle aquarium water was described, but the type of *Salmonella* was different than that in our case (1).

Salmonella Chester was isolated from sea turtle meat and water in a restaurant in Australia, with 36 people infected, but the investigators were unable to connect the infections with the ingestion of turtle as the diseased had several common risk factors for the disease (2,5).

In the past, *Salmonella* infections transmitted from pets were common, but there is no evidence in the literature that such infections were caused by *Salmonella* Chester (4).

Salmonellosis usually presents with gastroenterocolitis, the illness lasts three

to seven days, most people recover without specific treatment.

Infection can lead to septicaemia or complications outside of the intestines. Complications are more common in people over the age of 50 years, in children under three months of age, in patients with associated chronic illnesses, diabetes, artificial heart valves, artificial joints, vascular implants, in cancer patients and in immunocompromised patients (1,3,6).

Patient 1 belonged to a group of elderly patients with immunodeficiency and was treated with methylprednisolone.

Etiological diagnosis is based on stool sampling and cultivation, which is positive in approximately 6 % of patients with acute disease (3).

In our study, the diagnosis was etiologicaly confirmed in three of five patients.

In highrisk groups of patients and/or in patients with a severe course of the disease the treatment of infectious diarrhoea empirically begins with one of the quinolones (3). Patient 1 received antibiotics because of immunodeficiency, whereas the rest of the patients had no antibiotic therapy. Because of initially etiologicaly unexplained diarrhoea, she was put on combination therapy with ciprofloxacin and azithromycin, as campylobacters as a possible cause of gastroenterocolitis can be resistant to ciprofloxacin (7).

Empirical antibiotic therapy is contraindicated in immunocompetent children without known pathogen isolated from stool samples because of the possibility of haemolytic-uremic syndrome development (8). Retrospective studies in children show that short-term antibiotic therapy prolonged carrying the pathogens in stool, and is indicated only in a group of children at risk of complications (6,9).

In *Salmonella*-induced diarrhoea these pathogens can occur in stools for several weeks (in adults on average for four to five weeks and in children for up to seven weeks), which can be dangerous when the diseased are involved in the preparation and distribution of food. The carriage lasts longer in patientstreated with antibiotics. Up to 4 % of patients remain permanent carriers (3,9).

Contrary to the literature data, the antibiotic-treated Patient 1 no longer excreted *Salmonellas* in the stool after a month. Patient 2 and her sister remained carriers after three and six weeks, respectively. Their stool cultures were negative for the pathogen as late as after nine weeks.

In micro-epidemic outbreaks of acute gastroenterocolitis the source of infection is not always obvious. Our paper demonstrates that pets can be disease carriers. The paucity of literature data strongly suggests that these diseases are commonly overlooked.

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