

Short Communication

A Severe *Salmonella enterica* Serotype Paratyphi B Infection in a Child Related to a Pet Turtle, *Trachemys scripta elegans*

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SUMMARY: Our report highlights a case of severe childhood salmonellosis related to a pet turtle, a red-eared slider (*Trachemys scripta elegans*). A 6-year-old girl had gastroenteritis complicated with sepsis caused by serotype Paratyphi B, which shared the same pulsed-field gel electrophoresis profiles with the organism isolated from a pet turtle. Based on our literature survey on childhood invasive salmonellosis acquired from reptiles, this case is the first documented reptile-associated salmonellosis including sepsis caused by this serotype.

Reptiles including turtles are well-recognized as a reservoir of *Salmonella*, with 50-90% fecal carriage rates (1-3), and thus they are a source of human salmonellosis. *Salmonella* infection usually develops into moderate gastroenteritis, and most people recover without treatment. However, it may lead to more severe complications such as septicemia and meningitis, particularly in infants, elderly individuals, and immunocompromised persons, and some cases have a fatal outcome (4,5). We present a severe case of turtle-associated salmonellosis in a younger child.

A 6-year-old girl was admitted to our medical center with a 4-day history of fever, vomiting, abdominal pain, and watery diarrhea. Physical examination revealed a temperature of 38.5°C, a leukocyte count of 7,100/ μ L, and a C-reactive protein level of 4.01 mg/dL with mild hepatic dysfunction. Blood and stool culture samples taken on admission yielded a Gram-negative aerobic rod, identified as *Salmonella enterica* serotype Paratyphi B, while no notable bacteria were found in nasopharyngeal and urine cultures. MICs, as determined by a broth microdilution method (6), were identical for the two isolates: ampicillin, <4 μ g/mL; cefotaxime, <8 μ g/mL; levofloxacin, <1 μ g/mL; trimethoprim-sulfamethoxazole, <2 μ g/mL; and fosfomycin, <4 μ g/mL. The girl was treated for gastroenteritis complicated with sepsis by intravenous fosfomycin (150 mg/kg/d) from days 1 to 5, and the treatment was then replaced by intravenous ampicillin therapy (1.5 g/d) until her discharge due to an elevation of liver function parameters. All other blood and stool cultures remained negative during the rest of the child's hospitalization. The girl was discharged on day 11 in good condition.

There was no history of overseas travel, or of ingestion of suspected foods by the child or her family members, which prompted us to trace the routes of infection. The girl herself had taken care of a small pet turtle, a red-eared slider (*Trachemys scripta elegans*), and water specimens from the pet turtle's tank yielded serotype Paratyphi B. Isolates from both the child and turtle shared pulsed-field gel electrophoresis profiles of genomic DNAs digested with *Xba*I or *Bln*I (Fig.

1), and thus the case was demonstrated to be turtle-associated salmonellosis.

The literature back to 1990 was surveyed for severe salmonellosis relevant to reptiles in childhood with no underlying diseases. Twelve cases have been described, all of which were observed in infants under 21 months of age, with three fatal outcomes (Table 1). Reptile-associated *Salmonella* serotype Poona was isolated from three cases, whereas there were no previous mentions of serotype Paratyphi B severe infections among those cases. Moreover, no cases of serotype Paratyphi B infections associated with either turtles or other reptiles have been reported overseas, even when the search was expanded to include moderate salmonellosis in childhood and adults. Up to the present, the only documented reptile-associated infection with serotype Paratyphi B is a domestic case of gastroenteritis in a 70-year-old woman in 1985. In this case, the pathogen was also isolated from a pet, a red-eared slider turtle, as well as from stool cultures of an asymptomatic 7-year-old boy who was a family member. Subsequent epidemiological investigation by the regional public health institute revealed that the same pathogen was detected in turtles or turtle tanks in 4 of 12 pet shops in the city (15).

The Food and Drug Administration (FDA), USA pro-

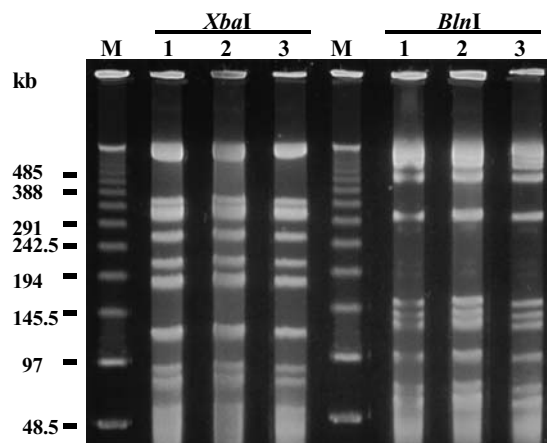


Fig. 1. Profiles of the genomic DNAs of *Salmonella enterica* serotype Paratyphi B isolates after digestion with *Xba*I or *Bln*I. Lane 1, child stool isolate; lane 2, child blood isolate; lane 3, isolate from turtle's tank; lane M, lambda DNA ladder as molecular size markers.

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Table 1. Summary of published cases of severe childhood salmonellosis due to reptiles

Year	Species	Reptiles	Patient			Geographic origin	Reference
			Age	Sex	Type of infection (outcome)		
2005	<i>S. Paratyphi B</i>	Red-eared slider	6 yr	F	Sepsis	Chiba, Japan	This study
2002	<i>S. Poona</i>	Iguana	21 mo	–	Sepsis	Connecticut, USA	14
2000	<i>S. Poona</i>	Iguana	27 d	M	Meningitis	UK	13
2000	<i>S. Arizonae</i>	Iguana	7 mo	F	Osteomyelitis	Ohio, USA	12
2000	<i>S. IV (44:22:z₂₃)</i>	Iguana	8 mo	M	Osteomyelitis	Italy	11
2000	<i>S. Poona</i>	Iguana	4 mo	M	Meningitis (died)	UK	10
2000	<i>S. Rubislaw</i>	Water dragon	3 wk	–	Meningitis (died)	UK	9
1998	<i>S. Marina</i>	Iguana	5 mo	M	Sepsis (died)	Wisconsin, USA	4
1997	<i>S. Uzaramo</i>	Snake	5 mo	M	Meningitis	UK	8
1996	<i>S. IV (44:z₄:z₂₃:–)</i>	Iguana	3 wk	M	Sepsis	Arizona, USA	4
1994	<i>S. Rubislaw</i>	Iguana	5 mo	F	Sepsis, Meningitis	New Jersey, USA	7
1994	<i>S. Kintambo</i>	Savanna monitor lizard	2 d	M	Sepsis	North Carolina, USA	7
1994	<i>S. Stanley</i>	Baby aquatic turtle	6 wk	M	Sepsis, Meningitis	Ohio, USA	7

–, unknown.

hibited the distribution and sale of turtles with a carapace less than 4 inches in length in 1975 after increased public health concerns over pet turtle-associated salmonellosis during the 1970s (21 Code of Federal Regulations S1240.62). Continuous management and educational activity have been undertaken by the FDA to counter the illegal distribution of small turtles. However, the regulations, with some exceptions, allow exporting turtles to other countries. In Japan, more than 500,000 live turtles are imported annually from the United States, corresponding to 75% of total live turtle imports. Thus, baby red-eared slider turtles, easily obtained at pet stores or street fairs, are very popular pets for small children at home or in child-care facilities, which may increase the risk for turtle-associated salmonellosis with severe invasive status in infants. However, science-based risk assessment has not been undertaken by the appropriate governmental agencies due to the fact that no severe cases have thus far been reported. Although our case is the first documented severe infection caused by turtle-associated *Salmonella* in Japan, *S. enterica* serotype Braenderup meningitis was noted in a 15-month-old girl in our medical center. In this case, stool cultures of the family members, who had neither abdominal pains nor diarrhea, revealed *Salmonella*-negative results. At home, the family kept a red-eared slider, with which the infant had frequently played, and it was suspected to be the only possible source of the isolate, though culture specimens from the turtle's tank could not be obtained. These two cases occurred at a 6-month interval in 2005, which should help raise public awareness of *Salmonella* infections associated with pet turtle exposure. Thus, the Ministry of Health, Labour and Welfare promptly issued a notice to local governments calling attention to these severe cases of salmonellosis. Adequate information should also be continuously provided to people by governmental organizations through educational activities.

Finally, when infant salmonellosis is diagnosed, we would like to stress the importance of obtaining patient background information specifically with regard to whether or not the patient had been in contact with reptiles, including turtles, at home or at child-care facilities, in addition to background information relevant to foodborne diseases, in order to specify the source and route of infections.

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