Short Communication

Four Sporadic Pediatric Cases of *Yersinia enterocolitica* O:8 Infection in a Rural Area of Japan

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**SUMMARY**: In the spring of 2015, we experienced a cluster of 4 sporadic cases of yersiniosis in children in Nagano prefecture, a rural area of Japan. Two patients developed appendicitis-like episodes; one had acute gastroenteritis, and the other had bacteremia associated with liver abscess. The causative agent of these infections was *Yersinia enterocolitica* serogroup O:8. None of the patients had an underlying illness, and all have recovered completely. The patients were neither socially nor geographically related to each other. These 4 consecutive cases suggest that *Y. enterocolitica* O:8 has spread substantially in the middle part of Japan, and that this virulent strain might be more common than previously reported in our country.

*Yersinia enterocolitica* is a well-known, gram-negative bacillus that may cause acute gastroenterocolitis and other extraintestinal infections, including sepsis. Infection with *Y. enterocolitica* results in a zoonotic disease in humans. The organism has been isolated from domestic and wild animals, including pigs, cattle, sheep, goats, rabbits, dogs, cats, and small rodents. However, this pathogen is not commonly detected in Japan, according to recent epidemiological data. In the spring of 2015, we experienced a cluster of pediatric Yersiniosis cases in Nagano prefecture, a rural area of Japan. Here, we present the cases.

In early April, an 11-year-old girl (case 1) developed high fever and abdominal pain, and later, diarrhea. Her fever lasted for 4 days. She reported no consumption of raw meat or undisinfected water and no direct contact with animals before her illness. She was referred to Nagano Children’s Hospital with suspected appendicitis. Laboratory data on admission were as follows: white blood cells, 9,900/μl; neutrophils, 86% neutrophils; hemoglobin, 14.0 g/dl; platelets, 290 × 10^3/μl; and CRP, 9.0 mg/dl. Blood culture was not obtained. Multiple enlarged mesenteric lymph nodes were observed using abdominal ultrasonography. The patient was admitted and treated without antimicrobials. Her stool yielded *Y. enterocolitica* serogroup O:8. The strain was resistant to ampicillin and 1st generation cephaplopins, but susceptible to 2nd and 3rd generations of cephalosporin, trimethoprim/sulfamethoxazole, and fluoroquinolone. The patient was discharged home 5 days later without sequelae.

A 5-year-old boy (case 2) developed high fever and was admitted to Nagano Children’s Hospital on day 2. High fever continued and he developed abdominal pain, mild loose stool, and transient erythema on his foot. His symptoms started early in April and he had consumed basashi (raw horse meat) and sushi several days before admission. Laboratory data on admission were as follows: white blood cells, 18,400/μl with 73% neutrophils; hemoglobin, 13.6 g/dl; platelets, 290 × 10^3/μl; and CRP, 8.6 mg/dl. Abdominal ultrasonography revealed wall thickening of the terminal ileum and marked swelling of mesenteric lymph nodes. The patient was treated supportively without antimicrobials, and his symptoms subsided by day 6. He was discharged home on day 8. Cultures of blood and stool yielded no remarkable pathogens; however, his serum anti-*Y. enterocolitica* O:8 antibody titer, measured using the tube agglutination test (Widal method), showed a significant increase in paired sera (from 1:20 on day 4 to 1:320 on day 11).

A 13-year-old boy (case 3) developed right-sided abdominal pain followed by high fever in late April. He had no history of raw meat intake; however, he had taken care of a sick domestic rabbit before the onset of his illness. On day 4, he was admitted to a local hospital and treated with multiple antimicrobials (cefmetazole and amikacin, later switched to piperacillin/tazobactam). Significant mesenteric lymphadenitis was detected using abdominal CT. On day 9, the patient was referred to Nagano Children’s Hospital because his symptoms had not abated. He was treated supportively and also received IV cefmetazole until his blood culture tested negative for pathogens. His fever and abdominal pain had subsided, and therefore, he was discharged home on day 13. His blood and stool cultures yielded no pathogens, but his serum anti-*Y. enterocolitica* O:8 specific antibody level, measured using the tube agglutination test, was significantly elevated (1:320 on day 9).

A 2-year-old boy (case 4) presented with high fever, vomiting, and watery diarrhea in mid-April. He had...
not consumed raw meat, been exposed to undisinfected water, nor had direct contact with animals before the illness; however, there had been some children with gastrointestinal symptoms in his kindergarten. On day 5 of illness, he was referred to Nagano Children’s Hospital. Diffuse thickening of the intestinal wall and swelling of intraabdominal lymph nodes were revealed using abdominal ultrasonography. The patient’s stool and blood culture yielded *Y. enterocolitica* O:8. Initially, he was treated with IV cefotaxime and his fever subsided on day 8; however, the high fever relapsed 3 days later. Because an adverse drug event was suspected, cefotaxime was discontinued and treatment was switched to oral trimethoprim/sulfamethoxazole with standard dosing (8 mg of trimethoprim per kg daily). The fever subsided on day 15, and he was discharged home on day 16. However, low-grade fever and diarrhea continued after discharge, and therefore, the patient was re-admitted to our hospital on day 25. Abdominal CT revealed a liver abscess (17 × 13 mm) in the right lobe, but surgical drainage was not attempted. A higher dose of trimethoprim/sulfamethoxazole (16 mg of trimethoprim per kg per day) was restarted and continued for a total of 7 weeks (intravenously for 2.5 weeks and orally for 4.5 weeks). The size of the liver abscess decreased gradually and it disappeared within 6 weeks. Immunological investigations, including lymphocyte markers, measurement of immunoglobulins G, A, and M, and serum ferritin concentration were all within the normal ranges. The patient had no evidence of immunodeficiency, iron storage disorders, or diabetes mellitus. He was discharged home on day 44 and had no apparent sequelae or comorbidity after 10 months of follow-up.

None of our patients had an underlying illness, and all have recovered completely from the infection. Clinical characteristics of the patients are shown in Table 1. The patients had no social or familial connections. The patients lived at a considerable geographical distance (15 km to 80 km) from each other. Furthermore, our patients did not share common food or animal contact. One patient had contact with a sick rabbit, a potential source of *Yersinia*. Otherwise, the source of the etiological agent in yersiniosis was unknown.

*Enterocolitis* is the most common clinical manifestation of *Y. enterocolitica* infection, which occurs mostly in children younger than 5 years. Bloodstream infection may occur in a healthy host, as well as in those with underlying disorders. Bacteremia has been reported mostly in young infants and in children with iron overload. In older children, mesenteric adenitis (pseudoappendicitis) or terminal ileitis are the major clinical manifestations.

*Y. enterocolitica* serogroup O:8 is a virulent strain, which may cause severe infections, such as septicemia (1,2). In Japan, however, serogroup O:3 has been recognized as the predominant strain of *Y. enterocolitica* (3).

According to reports from the Japanese Ministry of Health, Labour and Welfare, the number of food poisoning cases due to *Y. enterocolitica* is small, accounting for 0 to 0.3% of the total cases annually. In fact, there were no reported cases of food poisoning due to *Y. enterocolitica* between 2005 and 2011. However, a small number of *Y. enterocolitica* cases have been consistently reported since 2012, and the majority of them were caused by serogroup O:8 (4). Moreover, an increase in *Y. enterocolitica* O:8 infections has been reported recently in European countries, such as Poland (5).

On the other hand, there have been few pediatric case reports of *Y. enterocolitica* infections in Japan recently. However, interestingly, all of those cases were due to serogroup O:8 (6–9).

Our 4 sporadic cases from different regional sites encountered within a short period suggest that *Y. enterocolitica* O:8 has spread widely in Nagano prefecture, in the center of Japan. This virulent strain might therefore be more common than previously reported in our country. Recent trends of yersiniosis may require more attention from physicians with regard to this potentially dangerous pathogen.

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Conflict of interest None to declare.

REFERENCES


**Table 1. Characteristics of 4 patients with *Yersinia enterocolitica* O:8 infection**

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Sex</th>
<th>Clinical presentation</th>
<th>WBC (10³/mm³)</th>
<th>CRP (mg/dl)</th>
<th>Culture positive</th>
<th>Serology</th>
<th>Diagnosis</th>
<th>Antimicrobial</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>F</td>
<td>Fever, abdominal pain, diarrhea</td>
<td>9.9</td>
<td>9.1</td>
<td>Stool</td>
<td>Not done</td>
<td>Enteritis, mesenteric adenitis</td>
<td>None</td>
<td>Recovered</td>
</tr>
<tr>
<td>5</td>
<td>M</td>
<td>Fever, abdominal pain, rash</td>
<td>18.4</td>
<td>8.7</td>
<td>None</td>
<td>Positive</td>
<td>Ileitis, mesenteric adenitis</td>
<td>None</td>
<td>Recovered</td>
</tr>
<tr>
<td>13</td>
<td>M</td>
<td>Fever, abdominal pain, diarrhea</td>
<td>14.2</td>
<td>6.1</td>
<td>None</td>
<td>Positive</td>
<td>Mesenteric adenitis</td>
<td>Cefmetazole</td>
<td>Recovered</td>
</tr>
<tr>
<td>2</td>
<td>M</td>
<td>Fever, diarrhea, liver abscess</td>
<td>18.4</td>
<td>14.9</td>
<td>Blood Stool</td>
<td>Not done</td>
<td>Enteritis, bactemia, liver abscess</td>
<td>Cefotaxime, trimethoprim/sulfamethoxazole</td>
<td>Recovered</td>
</tr>
</tbody>
</table>


