Clinical Features of Bacteremia due to *Campylobacter jejuni*

Takehiko Mori¹,², Naoki Hasegawa¹, Kayoko Sugita¹, Masayoshi Shinjoh¹, Nobuhiro Nakamoto¹, Takayuki Shimizu¹, Shingo Hori¹, Osamu Iketani¹, Hiroshi Fujiwara¹, Yaoko Takano¹ and Satoshi Iwata¹

**Abstract**

**Objective** The clinical features of bacteremia due to *Campylobacter jejuni* (*C. jejuni*) have yet to be fully elucidated.

**Methods and Results** The cases of *C. jejuni* bacteremia were retrospectively reviewed during a twelve-year period in a single institute. *C. jejuni* was identified in 7 patients through blood cultures, and disease onset occurred between June and October. Except for 2 previously healthy individuals, 5 patients had underlying diseases (chronic liver diseases, n=3; hematological malignancies, n=2). All patients were febrile, but 2 patients did not present with gastrointestinal symptoms. *C. jejuni* isolates were susceptible to gentamicin and macrolides, but about half of them were resistant to fluoroquinolones. Disease outcomes were favorable, and no deaths related to *C. jejuni* bacteremia were observed.

**Conclusion** These results suggest that *C. jejuni* bacteremia could occur primarily or secondarily to gastroenteritis with a seasonal peak and that prognosis would be favorable regardless of the underlying diseases.

**Key words:** *Campylobacter jejuni*, bacteremia, hematological malignancy, liver disease

(Intern Med 53: 1941-1944, 2014)  
(DOI: 10.2169/internalmedicine.53.2559)

**Introduction**

The most common clinical feature of infection due to *Campylobacter jejuni* (*C. jejuni*) is gastroenteritis resulting in watery diarrhea, abdominal pain, fever, and bloody diarrhea. Extraintestinal manifestations of *Campylobacter* infections include arthritis, meningitis, cholecystitis, endocarditis, and Guillain-Barré syndrome (1). Bacteremia due to *Campylobacter* species has been considered rare; it was detected in less than 1% of patients with gastroenteritis due to these species (2). Therefore, the clinical features of bacteremia due to *Campylobacter* species have been the focus of several investigators and have yet to be fully elucidated (2-10). Most previous reports are from European countries and included data obtained from cases of bacteremia due to not only *C. jejuni* but also other *Campylobacter* species. In this study, the medical records of patients with *C. jejuni* bacteremia were retrospectively reviewed to elucidate its clinical features.

**Materials and Methods**

**Patients**  
Keio University Hospital (Tokyo, Japan) is a primary and tertiary referral hospital in the center of Tokyo with a 1044-bed capacity. Cases of blood culture-confirmed *C. jejuni* bacteremia were retrospectively identified from the institutional database during a twelve-year period between January 2001 and April 2013, and medical records were reviewed. Demographic and clinical data, including age, gender, underlying diseases, symptoms, laboratory data at the onset of bacteremia, antimicrobial therapy, and outcomes, were collected for each patient.

¹Center for Infectious Diseases and Infection Control, Keio University School of Medicine, Japan, ²Division of Hematology, Keio University School of Medicine, Japan, ³Division of Gastroenterology, Keio University School of Medicine, Japan and ⁴Department of Emergency and Critical Care Medicine, Keio University School of Medicine, Japan

Received for publication January 25, 2014; Accepted for publication March 30, 2014

Correspondence to Dr. Takehiko Mori, tmori@a3.keio.jp
Table 1. Characteristics of the Patients and Clinical Courses

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (years)</th>
<th>Gender</th>
<th>Underlying diseases</th>
<th>Month of onset</th>
<th>Gastrointestinal symptoms</th>
<th>Body temperature (°C)*</th>
<th>WBC (×10⁶/L)*</th>
<th>Stool culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>54</td>
<td>Male</td>
<td>Acute leukemia</td>
<td>September</td>
<td>Vomiting</td>
<td>38.6</td>
<td>7.2</td>
<td>Not done</td>
</tr>
<tr>
<td>2</td>
<td>42</td>
<td>Female</td>
<td>Malignant lymphoma</td>
<td>June</td>
<td>None</td>
<td>38.0</td>
<td>4.0</td>
<td>Negative**</td>
</tr>
<tr>
<td>3</td>
<td>74</td>
<td>Female</td>
<td>Liver cirrhosis and cancer</td>
<td>June</td>
<td>None</td>
<td>39.2</td>
<td>7.3</td>
<td>Not done</td>
</tr>
<tr>
<td>4</td>
<td>63</td>
<td>Male</td>
<td>Chronic hepatitis</td>
<td>September</td>
<td>Diarrhea</td>
<td>38.3</td>
<td>14.7</td>
<td>Positive**</td>
</tr>
<tr>
<td>5</td>
<td>77</td>
<td>Male</td>
<td>Liver cirrhosis and cancer</td>
<td>August</td>
<td>Vomiting</td>
<td>38.8</td>
<td>8.1</td>
<td>Not done</td>
</tr>
<tr>
<td>6</td>
<td>19</td>
<td>Male</td>
<td>Healthy subject</td>
<td>October</td>
<td>Diarrhea</td>
<td>39.1</td>
<td>18.9</td>
<td>Not done</td>
</tr>
<tr>
<td>7</td>
<td>26</td>
<td>Male</td>
<td>Healthy subject</td>
<td>August</td>
<td>Vomiting</td>
<td>39.8</td>
<td>8.0</td>
<td>Not done</td>
</tr>
</tbody>
</table>

* Values indicate the maximum values during the clinical course in each patient. ** Positive or negative for Campylobacter jejuni.

WBC: white blood cell

Table 2. Treatment and Outcomes of Campylobacter jejuni Bacteremia and Drug Susceptibility

<table>
<thead>
<tr>
<th>Case</th>
<th>Antimicrobial therapy</th>
<th>Outcome</th>
<th>Gentamicin</th>
<th>Clarithromycin</th>
<th>Erythromycin</th>
<th>Ciprofloxacin</th>
<th>Levofloxacin</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ceftriaxone+Levofloxacin</td>
<td>Recovered</td>
<td>S</td>
<td>S</td>
<td>Not tested</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>2</td>
<td>Ciprofloxacin+Meropenem</td>
<td>Recovered</td>
<td>S</td>
<td>Not tested</td>
<td>S</td>
<td>Not tested</td>
<td>Not tested</td>
</tr>
<tr>
<td>3</td>
<td>Meropenem</td>
<td>Recovered</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>4</td>
<td>Azithromycin</td>
<td>Recovered</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>5</td>
<td>Tosufloxacin</td>
<td>Recovered</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>R</td>
<td>R</td>
</tr>
<tr>
<td>6</td>
<td>None</td>
<td>Unknown</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>7</td>
<td>None</td>
<td>Unknown</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>R</td>
<td>R</td>
</tr>
</tbody>
</table>

S: susceptible, R: resistant

Microbiological procedures

All blood cultures were tested using the BACTEC blood culture system (Becton Dickinson, Franklin Lakes, USA) according to the manufacturer’s instructions. Spiral-shaped or curved Gram-negative rods identified from the blood cultures that formed a distinct colony morphology were further processed to Campylobacter species using the API Campy system (bioMérieux, Marcy l’Étoile, France) according to the manufacturer’s instructions. The results were interpreted with the automatic API Campy analytical profile index software. The isolates were tested for susceptibility to gentamicin, clarithromycin, erythromycin, ciprofloxacin, and levofloxacin by means of the standard agar disk diffusion method.

Results

Patients and their characteristics

C. jejuni was identified in the blood cultures of 7 patients. Samples for blood cultures were obtained at the onset of a febrile episode in all the patients. Patient characteristics are shown in Table 1. The median age of the patients was 54 years (range: 19-77). The underlying diseases were chronic liver diseases due to the hepatitis C virus with and without liver cell carcinoma (3 patients) and hematological malignancies (2 patients), while 2 patients, aged 19 and 26 years, had no specific underlying diseases. The onset of C. jejuni bacteremia was observed between June and October in all cases, representing Japan’s rainy and summer months.

Clinical features of C. jejuni bacteremia (Table 1)

Accompanying symptoms were fever over 38°C in all patients and gastrointestinal symptoms in 5 patients (vomiting in 3; diarrhea in 2). In contrast, 2 patients were free from any gastrointestinal symptoms, including abdominal pain. No patients presented with granulocytopenia due to underlying diseases or to treatment before or at the onset of C. jejuni bacteremia. Case 2 presented with hypogammaglobulinemia (serum IgG 298 mg/dL). Elevation of white blood cell count to over 10.0×10⁶/L was observed only in 2 patients during the clinical course.

Treatment and outcomes of C. jejuni bacteremia and drug susceptibility

After the onset of bacteremia, various types of antimicrobial agents were administered empirically or therapeutically, including beta-lactams, fluoroquinolones, and macrolides (Table 2). After treatment began, all patients promptly became afebrile. Because 2 cases were lost to follow-up, the outcomes could be evaluated only in 5 patients, all of whom recovered without any sequelae or recurrence. All the isolates were susceptible to gentamicin and macrolides, whereas only three of six evaluated isolates were susceptible to fluoroquinolones (ciprofloxacin or levofloxacin) (Table 2). C. jejuni from ascites was also obtained from case 3, whose symptoms and laboratory data improved after the initiation of empirical treatment with meropenem. Case 5, who presented with bacteremia due to an isolate resistant to
fluoroquinolones, was treated with tosufloxacin alone, and the patient recovered successfully without any sequelae. Two young patients (cases 6 and 7) without underlying diseases were not empirically given antimicrobial agents and were lost to follow-up, since they did not revisit the hospital thereafter.

**Discussion**

In the present retrospective study of a primary and tertiary referral hospital with a capacity of over 1,000 beds, we have identified only 7 cases of bacteremia due to *C. jejuni* during a twelve-year period. This low rate of detecting *C. jejuni* bacteremia was consistent with previous studies (2-10). The rarity of documented *C. jejuni* bacteremia could partly be explained by underdiagnosis due to bactericidal properties of human serum against the species (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.

In the present study, patients developed *C. jejuni* bacteremia between June and October, mostly during the rainy and summer months (June, August, and September) in Japan. There is little information about seasonal issues for summer months (June, August, and September) in Japan. Mia between June and October, mostly during the rainy and derestimated.

Conducted in Finland has shown the seasonal distribution of the incidence (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.

In the present study, patients developed *C. jejuni* bacteremia between June and October, mostly during the rainy and summer months (June, August, and September) in Japan. There is little information about seasonal issues for summer months (June, August, and September) in Japan. Mia between June and October, mostly during the rainy and derestimated.

Conducted in Finland has shown the seasonal distribution of the incidence (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.

In the present study, patients developed *C. jejuni* bacteremia between June and October, mostly during the rainy and summer months (June, August, and September) in Japan. There is little information about seasonal issues for summer months (June, August, and September) in Japan. Mia between June and October, mostly during the rainy and derestimated.

Conducted in Finland has shown the seasonal distribution of the incidence (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.

In the present study, patients developed *C. jejuni* bacteremia between June and October, mostly during the rainy and summer months (June, August, and September) in Japan. There is little information about seasonal issues for summer months (June, August, and September) in Japan. Mia between June and October, mostly during the rainy and derestimated.

Conducted in Finland has shown the seasonal distribution of the incidence (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.

In the present study, patients developed *C. jejuni* bacteremia between June and October, mostly during the rainy and summer months (June, August, and September) in Japan. There is little information about seasonal issues for summer months (June, August, and September) in Japan. Mia between June and October, mostly during the rainy and derestimated.

Conducted in Finland has shown the seasonal distribution of the incidence (11). Another possible explanation is that blood cultures are not routinely performed for acute gastroenteritis even when patients are febrile. Therefore, the incidence of *C. jejuni* bacteremia may be underestimated.
of the patients’ clinical history. Larger studies of *C. jejuni* bacteremia are needed in order to further evaluate its clinical and microbiological features and determine the optimal treatments for improving the disease outcome.

The authors state that they have no Conflict of Interest (COI).

Acknowledgement
The authors are indebted to Yuri Niizuma for her skillful data management of the patient information.

References

© 2014 The Japanese Society of Internal Medicine
http://www.naika.or.jp/imonline/index.html