Bacteremia Due to *Campylobacter* Species: Clinical Findings and Antimicrobial Susceptibility Patterns

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From 1979 to 1996, 58 patients (mean age, 39.4 years) were treated for bacteremia due to *Campylobacter* species at the Hospitals Vall d’Hebron in Barcelona, Spain. Bacteremia was considered to be hospital acquired in 30% of these patients. Almost all the patients (93%) had underlying conditions; liver cirrhosis was the most frequent (34% of patients), and neoplasia, immunosuppressive therapy, and human immunodeficiency virus disease were also common. Of the 58 *Campylobacter* strains isolated, 81% were *C. jejuni*, 10% were *Campylobacter* species, 7% were *C. fetus*, and one (2%) was *C. coli*. Resistance rates were: cephalothin, 82%; co-trimoxazole, 79%; quinolones, 54%; ampicillin, 20%; amoxicillin/clavulanate, 4%; erythromycin, 7%; gentamicin, 0; and tetracyclines, 0. Even though the majority of patients were immunocompromised, mortality was low (10.5%), and only one patient relapsed. Because of the high level of resistance to the quinolones in *Campylobacter* species, these drugs should not be used as empirical treatment, at least in Spain. Although the macrolides remain the antibiotics of choice, amoxicillin/clavulanate may be an effective alternative therapy.

*Campylobacter* species (especially *C. jejuni*) have become an increasingly recognized cause of gastroenteritis in children and adults. Bacteremia caused by these microorganisms is uncommon [1–4], and most reports of bacteremia due to *Campylobacter* species describe only a small number of cases [5–8]. The significant increase in the number of compromised patients in Spanish hospitals (e.g., transplant recipients, HIV-infected patients, and those receiving immunosuppressive therapy) may be responsible for the increase in the prevalence of campylobacter bacteremia. The clinical findings and the outcome for patients with campylobacter bacteremia have not been extensively studied, especially in this group of compromised patients.

Erythromycin is the antimicrobial agent most frequently used to treat these infections, and the quinolones have been recommended as alternative therapy. However, several reports have shown increasing resistance of *C. jejuni* to quinolones, a fact that deserves concern [1, 4, 9, 10].

The purpose of our study was to review the clinical features, underlying conditions, antimicrobial susceptibility patterns, and outcome for 58 patients with campylobacter bacteremia.

**Patients and Methods**

We reviewed the medical records of all patients who had bacteremia due to *Campylobacter* species between 1 January 1979 and 31 December 1996 at the Hospitals Vall d’Hebron (Barcelona, Spain). This university-affiliated public health institution with a 1,300-bed capacity (1,600 beds before 1991) has active programs in solid-organ and bone marrow transplantation. For the records review, we placed special emphasis on time of the year when bacteremia occurred, whether it was community acquired or nosocomial, the presence of underlying conditions, the clinical findings and associated complications, therapy, and outcome.

Nosocomial bacteremia was defined according to the 1988 Centers for Disease Control (CDC) definition for nosocomial infections [11]. Diagnoses of AIDS were made on the basis of the 1987 CDC surveillance criteria for AIDS [12]. Antibiotic therapy was considered inappropriate if the isolate proved to be resistant to the empirically chosen drugs. The death of a patient was considered to be related to bacteremia only if the bacteremic episode was shown to be the direct cause of death. Under other circumstances, death was considered to be unrelated to bacteremia.

Over the period of the study, three different blood culturing methods were in use at our hospital. During the first period (1979–1985), conventional blood cultures were performed with use of Castaneda and anaerobic medium. Both bottles were examined daily the first week and once on the 14th day, before patients were discharged. Blind subcultures were done on the second and seventh day in aerobic and anaerobic atmospheres. During the second period (1986–1995), the BACTEC NR nonradiometric 660 HPS System (Becton Dickinson, Sparks, MD) was used for culturing. Each blood culture consisted of a pair of vials: NR6A (aerobic medium) and NR7A (anaerobic medium). The aerobic vial was shaken during the first day. Both vials were incubated at 35°C and inspected daily the first week and once on the 14th day. In 1996, the BACTEC
9240 system (Becton Dickinson) came into use. Each blood culture consisted of a pair of vials: PLUS aerobic/F and PLUS anaerobic/F media or PED PLUS/F (pediatric medium). All vials were shaken continuously for 5 days and incubated at 35°C.

When the medium showed evidence of microbial growth or vials showed positive CO₂ readings, cultures were treated as follows: a gram-stained smear was prepared, and subcultures were set up for each bottle on brain-heart blood agar plates incubated in an atmosphere enriched with 10% CO₂ and on MacConkey agar plates incubated aerobically. Samples from the anaerobic medium were also subcultured on blood agar plates incubated in anaerobic atmosphere. If the presence of Campylobacter species was suspected (i.e., the isolates were curved or spiral gram-negative rods), subculture was done on nonselective blood agar plates incubated under microaerophilic (10% CO₂, 5% O₂, and 85% N₂) conditions at 37°C and 43°C for 3 days.

Stool samples were plated on brain-heart infusion agar with 5% hemolyzed blood and vancomycin, cefoxitin, colistin, and amphotericin B. Plates were incubated at 37°C in a microaerophilic atmosphere for 3 days. The cultures were examined daily.

Campylobacter strains were identified by means of the following tests: dark-field microscopy for motility and morphology, gram staining and oxidase and catalase production, hydrolysis of sodium hippurate, H₂S production on triple sugar iron and in the presence of 1% cysteine hydrochloride (lead acetate strip method with brain-heart broth as base), growth on brain-heart blood agar plates incubated at 25°C and 42°C, and susceptibility to nalidixic acid (130-μg disk) and cephalothin (66-μg disk). The microorganism was considered to be susceptible to nalidixic acid and cephalothin when the diameter of the zone of inhibition was ≥25 mm and ≥23 mm, respectively.

The antibiotic susceptibility of Campylobacter strains was determined by the Kirby-Bauer disk diffusion method [13] on Mueller-Hinton agar plates with 5% horse blood with use of Rosco disks (Neo-Sensitab; Rosco Diagnostica, Tästrup, Denmark) [14]. Susceptibility to erythromycin (78-μg disk, zone of inhibition ≥26 mm) was determined over the entire study period. In addition, since 1989, the susceptibility of Campylobacter species to the following agents was determined: ciprofloxacin (10-μg disk, zone of inhibition ≥20 mm), norfloxacin (10-μg disk, zone of inhibition ≥16 mm), ampicillin (33-μg disk, zone of inhibition ≥20 mm), doxycycline (80-μg disk, zone of inhibition ≥20 mm), gentamicin (40-μg disk, zone of inhibition ≥23 mm), trimethoprim-sulfamethoxazole (co-trimoxazole; 5.2/240-μg disk, zone of inhibition ≥28 mm), and amoxicillin/clavulanate (30/15-μg disk, zone of inhibition ≥20 mm).

Results

From 1979 to 1996, campylobacter bacteremia was diagnosed in 58 patients; half of these cases were diagnosed in the last 7 years. During this 18-year period, 0.1% of all positive blood cultures in our hospital yielded Campylobacter. The majority of the infections (43 of the 58 cases) occurred in the summer and autumn months. The mean age of the patients was 39.4 years (range, 4 days to 87 years); 12 (21%) of these patients were under 15 years of age, and eight (14%) were over 65 years of age. Thirty-eight (66%) were males. Bacteremia was considered to be hospital acquired in 16 (30%) of 54 patients and occurred an average of 19 days (range, 4–52 days) after admission. There was no obvious clustering of our cases during the 18-year period.

Underlying conditions. Almost all patients (93%) had underlying conditions, as listed in table 1. Liver cirrhosis, usually Child B or C, was the most frequent (34% of patients), and neoplasia and immunosuppression due to chemotherapy were also common.

Seven cases occurred in HIV-infected patients (two of these patients had liver cirrhosis as well). Our first case showing the association between HIV infection and campylobacter bacteremia was identified in 1986, and since then we have diagnosed 41 cases of campylobacter bacteremia. Thus, the overall incidence of this association is 17% (7 of 41 cases) in our series. From 1981 to 1996, ~1,200 cases of AIDS were diagnosed at our hospital; therefore, the incidence of campylobacter bacteremia in this group of patients was ~0.6%. AIDS had previously been diagnosed for all seven of our patients with campylobacter bacteremia and HIV disease. All cases were classified as IV A or C, according to the 1987 CDC classification for HIV-infected patients. Six patients were receiving trimethoprim-sulfamethoxazole prophylaxis for Pneumocystis carinii pneumonia. All the isolates from these patients were resistant to co-trimoxazole. None of these patients was neutropenic, but all had low CD4 lymphocyte counts (mean count, 19/mm³; range, 1–36/mm³).

Three of the patients were pregnant, and two of them had spontaneous miscarriages during the episode of bacteremia.

All 16 patients with hospital-associated campylobacter bacteremia had underlying conditions (immunosuppression related to corticosteroid therapy [8], chemotherapy [4], or transplantation [4]; liver cirrhosis [3]; systemic lupus erythematosus [2]; chronic renal failure [2]; HIV infection [1]; leukemia [1]; lymphoma [1]; and solid-organ neoplasia [1]).

Microorganisms. The median time until detection of positive blood cultures was 3 days (range, 2–7 days). Of the 58 Campylobacter species isolated, 47 (81%) were C. jejuni, four (7%) were C. fetus, six (10%) were Campylobacter species, and one (2%) was C. coli. Stool cultures were performed for 37 patients, and 15 (40%) were positive; C. jejuni was isolated in all cases. All four patients with C. fetus bacteremia had negative stool cultures. In one case C. jejuni was also isolated from the peritoneal fluid, and in another, C. fetus was also recovered from a gluteal abscess.

Table 2 shows antimicrobial resistance rates among the 58 isolates of Campylobacter species from our patients. Since
1991, we have witnessed a striking increase in the percentage of strains resistant to the quinolones (81%, 13 of 16 isolates); the percentage for nalidixic acid was 88% (14 of 16 isolates). Erythromycin resistance during that period was 11% (three of 27 isolates). Twenty percent of the isolates were resistant to ampicillin, but only 4% were resistant to amoxicillin/clavulanate.

There were no relevant differences in antibiotic susceptibility between strains isolated from hospital-associated and community-acquired campylobacter bacteremia.

**Clinical features.** The clinical characteristics of the patients are shown in table 3. Fever was the most common clinical manifestation (91% of patients). Only one-third (18 of 54) of the patients had diarrhea, and stool cultures were positive for 12 (66%) of them. Stool cultures were performed for 19 of the 36 patients without diarrhea, and three (16%) were positive.

Four patients had cellulitis; one had arthritis of the knee and a negative articular fluid culture, one had meningitis, and one developed lower-leg thrombophlebitis (due to *C. fetus*), and one had pancreatitis, although she also had received corticosteroid therapy. One alcoholic woman with a previous contusion that caused a large gluteal hematoma was admitted to the hospital for treatment of hepatic encephalopathy. Two weeks later she developed fever, and the gluteal contusion became

<table>
<thead>
<tr>
<th>Underlying condition</th>
<th>C. jejuni</th>
<th>C. fetus</th>
<th>C. coli</th>
<th>Campylobacter species</th>
<th>Total no. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver cirrhosis</td>
<td>18</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>20 (34)</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>14</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>16 (30)¹</td>
</tr>
<tr>
<td>Corticosteroid therapy</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>13 (22)</td>
</tr>
<tr>
<td>Chemotherapy²</td>
<td>7</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>10 (17)</td>
</tr>
<tr>
<td>Neoplasia¹</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>8 (14)</td>
</tr>
<tr>
<td>HIV infection</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>7 (12)</td>
</tr>
<tr>
<td>Transplantation³</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>5 (9)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Hypogammaglobulinemia</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>4 (7)</td>
</tr>
<tr>
<td>Chronic renal failure</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3 (5)</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3 (3)</td>
</tr>
<tr>
<td>Nephrotic syndrome</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (2)</td>
</tr>
<tr>
<td>None</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4 (7)</td>
</tr>
</tbody>
</table>

* Some patients had more than one underlying condition.

¹ Refers only to antineoplastic agents.

² Refers only to antineoplastic agents.

³ Leukemia (3 patients), lymphoma (3), and solid-organ neoplasms (2).

⁴ Liver (3), kidney (1), bone marrow (1).

² Percentage refers to 54 patients for whom data were available.
Table 3. Clinical manifestations and outcomes for 58 patients with campylobacter bacteremia.

<table>
<thead>
<tr>
<th>Variable</th>
<th>C. jejuni</th>
<th>C. fetus</th>
<th>C. coli</th>
<th>Campylobacter species</th>
<th>Total no. of patients with feature/total no. of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>42/47</td>
<td>4/4</td>
<td>1/1</td>
<td>6/6</td>
<td>53/58 (91)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>18/43</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>18/54 (33)</td>
</tr>
<tr>
<td>Cellulitis</td>
<td>2/47</td>
<td>2/4*</td>
<td>0/1</td>
<td>1/6</td>
<td>5/58 (9)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>2/47</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>2/58 (4)</td>
</tr>
<tr>
<td>Arthritis</td>
<td>1/47</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>1/58 (2)</td>
</tr>
<tr>
<td>Meningoencephalitis</td>
<td>0/47</td>
<td>0/4</td>
<td>0/1</td>
<td>1/6</td>
<td>1/58 (2)</td>
</tr>
<tr>
<td>Thrombophlebitis</td>
<td>0/47</td>
<td>1/4</td>
<td>0/1</td>
<td>0/6</td>
<td>1/58 (2)</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>1/47</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>1/58 (2)</td>
</tr>
<tr>
<td>Septic shock</td>
<td>1/47</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>1/58 (2)</td>
</tr>
<tr>
<td>Mortality</td>
<td>6/46</td>
<td>0/4</td>
<td>0/1</td>
<td>0/6</td>
<td>6/57 (11)</td>
</tr>
</tbody>
</table>

* One of the patients had a gluteal abscess.

painful. Cultures of blood and gluteal exudate yielded C. fetus. She recovered after drainage was performed and a 3-week course of erythromycin therapy was administered. It is noteworthy that two patients had pulmonary involvement: one had right lower-lobe pneumonia, and the other had bilateral pulmonary infiltrates and no abnormal findings on echocardiographic and bronchoalveolar lavage studies. In both cases the pulmonary lesions resolved with erythromycin therapy alone; serological studies for *Mycoplasma pneumoniae*, *Legionella pneumophila*, and *Chlamydia psittaci* were negative. Only one of the 58 patients developed septic shock and disseminated intravascular coagulation. None of the patients developed Guillain-Barré syndrome (GBS) over a 6-month follow-up period.

Almost all of the 16 patients (87.5%) with hospital-associated campylobacter bacteremia had fever, six (37%) had diarrhea, and one each had extraintestinal manifestations (cellulitis and pancreatitis).

**Outcome.** The overall mortality was 10.5% (6 of 57 patients). The mortality among patients with hospital-associated campylobacter bacteremia was 12.5% (two of 16 patients). Death was considered to be related to campylobacter bacteremia for three of the six patients who died (the empirical antibiotic therapy was not appropriate in two cases). Death was due to hepatic failure in the other three (two had liver cirrhosis, and one had a liver transplant and chronic rejection). There were no deaths among patients with no underlying diseases or among the pregnant women.

The outcome was favorable for one-fifth of the survivors (11 of 52), although they had not received antimicrobial therapy or had received inappropriate antibiotic treatment (two cases). These patients had already been discharged before culture results were available. Thirty-nine patients recovered after receiving antibiotic treatment. The duration of therapy lasted from 1 to 3 weeks, and the majority of these patients were treated for 10–14 days. Erythromycin was the antibiotic most often used. It is of interest that the results were good for three patients who received only amoxicillin/clavulanate. Only one patient, an 8-month-old child with advanced HIV disease, relapsed. Despite adequate and prolonged courses of antimicrobial therapy (3 weeks each), she had three relapses and finally died with fever, diarrhea, and *C. jejuni* bacteremia.

**Discussion**

Campylobacter bacteremia is an uncommon disease [2]. As reported in other studies, the incidence in our series reached a peak in the summer and early fall months [1, 4, 15] and predominantly affected males (two-thirds of the cases) [1, 2, 4]. In contrast to other investigators [2, 15], we did not find a high incidence of this disease among patients >65 years old; however, there was a considerable incidence among children.

Campylobacter bacteremia usually occurs in patients with underlying conditions such as liver cirrhosis, malignancy, diabetes mellitus, HIV disease, and/or therapy-induced immunosuppression. This association is high in the case of *C. fetus* bacteremia [1, 5, 8]; however, in the case of *C. jejuni* bacteremia, a relationship as strong as we observed (94% of our 47 cases) has not been previously reported [1, 2, 4].

In one-third of our cases, bacteremia was considered to be hospital acquired. Other authors have not found such a high incidence of this association [1–4]. Although we do not know the prevalence of carriage of this microorganism in Spain, we believe that the majority of our patients were exposed to *Campylobacter* species in the hospital, since the symptoms (fever and/or diarrhea) appeared several days after admission, and bacteremia was detected a mean of 19 days (range, 4–52 days) after admission. Increased immunosuppression during hospitalization may also have played a role in some cases.
Although there are no data on whether immunosuppression increases susceptibility to infection with a smaller inocula of Campylobacter species, immunosuppressive therapy increases the risk of other foodborne diseases such as listeriosis [16], and hospitalized patients with underlying conditions are more immunosuppressed than outpatients [16].

Since most of our patients had underlying conditions and/or were receiving immunosuppressive therapy, this fact may partially explain the high incidence of nosocomial cases in our study. Because of the possibility that highly immunosuppressed persons may be more susceptible to lower inocula of microorganisms than the general population, it may be also advisable that such patients avoid undercooked foods, soft cheeses, and any other products prepared from unpasteurized milk.

Sporadic cases of bacteremia due to Campylobacter species have been described in patients with AIDS [17–19]. However, in cumulative series of AIDS patients with bacteremia, only one case due to Campylobacter species was reported among 291 patients with bacteremia [20–23]. The relatively high rate of campylobacter bacteremia we found is probably related to the high incidence of enteric infections due to this microorganism in our country, both in patients with and in patients without HIV infection [9, 10, 24, 25].

It is interesting to note that all the HIV-infected patients in our study had advanced HIV disease. Sorvillo et al. [26] suggested that infections due to Campylobacter species in patients with AIDS could be a marker for significant deterioration in immune status and that the presence of bacteremia implies limited survival. The increasing use of macrolides to treat infections due to Cryptosporidium species and for prophylaxis and treatment of Mycobacterium avium complex infections in patients with AIDS may decrease the incidence of campylobacter infections in the future. It has recently been suggested that rifabutin, a drug active against Campylobacter species in vitro and used for prophylaxis and treatment of mycobacterial diseases in patients with AIDS, seems to protect these patients from campylobacter infections as well [27].

Although C. fetus has been considered to be more likely to cause bacteremia than C. jejuni [1, 3, 6, 8], C. jejuni has been the predominant species in several studies of campylobacter infections [2, 5, 28, 29]. In our study, 90% of the isolates identified were C. jejuni, a microorganism that is highly prevalent in our country. In a review of four articles on acute gastrointestinal enteritis in Spain, the incidence of campylobacter infection ranged from 11% to 33% [30–33]. In our experience with gastroenteritis, Campylobacter species were the second most common agents isolated (27.6% of 4,407 isolates identified during a 9-year period) after Salmonella species (unpublished results). Of all the campylobacters isolated in stool cultures, we found that 97% were C. jejuni.

Bacteremia due to Campylobacter species can manifest in three clinical patterns [1]. First, transient bacteremia may occur in a healthy or compromised host following acute campylobacter enteritis. The bacteremia usually resolves spontaneously, and no specific treatment is required. This clinical pattern is common among patients with C. jejuni bacteremia (38% of our patients had diarrhea) and exceptional among those with C. fetus infections (none of our patients had gastroenteritis). Second, sustained bacteremia may occur in patients infected with strains that, in general, are relatively or absolutely serum resistant. This situation is more common with C. fetus [1, 4, 34]. The outcome is favorable when antimicrobial therapy is administered. Third, sustained bacteremia may occur in a compromised host; as was shown in our study, many such patients do not have acute enteritis. In some of these cases, bacteremia is recurrent, and antimicrobial therapy may need to be prolonged [1, 35].

In our experience, recurrent bacteremia was unusual, and although many of our patients had an underlying condition, we observed only one relapse in an HIV-infected patient. Characterization of these strains in terms of pathogenicity (serum resistance) and virulence, which was not available in our study, could have provided further information on the different clinical patterns of campylobacter bacteremia.

A variety of extraintestinal manifestations of campylobacter infection, such as cholecystitis, endocarditis, peritonitis, septic arthritis, meningitis, lung abscess, empyema, vertebral osteomyelitis, cellulitis, and septic thrombophlebitis, have been documented [1, 3–6, 35–37], particularly in patients with C. fetus infections. Cellulitis is a relatively common manifestation (7% of cases in our study); however, cutaneous abscess, as observed in one of our patients (previously published case report), is exceptional [38]. Pleural empyema and lung abscess due to Campylobacter species are rare but well-recognized infections [1, 35].

It has not as yet been clearly established that Campylobacter species are etiologic agents of pneumonia. However, in one series of extraintestinal manifestations of campylobacter infection [35], two cases of pneumonia were reported. Two of our patients had pneumonia that resolved with erythromycin therapy alone. No causal microorganisms were demonstrated (even when bronchoalveolar lavage was performed in one case). The fact that specific cultures for Campylobacter species are not routinely done with respiratory samples makes us believe that Campylobacter was the most probable etiologic agent.

C. jejuni is implicated as a trigger of GBS in 20%–40% of cases [1, 4, 38, 39]. Antibody cross-reactivity between bacterial cell-surface structures (including the C. jejuni 0:19 lipopolysaccharide) and nervous system glycolipids or myelin proteins may explain the pathogenesis of this disease. It is not surprising that none of our patients developed GBS, since the estimated incidence of this complication is lower than one case per 2,000 cases of C. jejuni infection [40]. It could also be speculated that since GBS might be an immunopathological reaction to Campylobacter, compromised patients might be at lower risk...
for GBS because of the impaired immunological response. Since certain serotypes are associated more frequently with GBS, serotyping could have provided some additional information about the absence of cases of GBS in our study.

Although most of our patients had an underlying condition, the mortality directly related to campylobacter infections was low (5%) and was similar to the mortality (2.5%) reported in a recent paper by Skirrow et al. [2]. These data contrast with those from previous studies in which the mortality was 20% [3].

Empirical antimicrobial therapy should be based on the susceptibility pattern in a given country. We have observed a striking increase in the rate of resistance of Campylobacter species to the quinolones (81%) in recent years. This fact agrees with other reports from Spain and studies from other countries [9, 10, 23, 41, 42] and has been partially attributed to the frequent use of the quinolones in veterinary and human medicine [42, 43]. Consequently, quinolones should not be used empirically in the treatment of infections caused by Campylobacter species, at least in Spain.

Macrolides are considered the antibiotics of choice for the treatment of C. jejuni infections. However, Campylobacter is not universally susceptible to macrolides, and resistance rates of 3%–11% have been reported [9, 10, 44–46]. Moreover, the recent demonstration of emergence of erythromycin resistance during therapy, which correlates with clinical relapse in HIV-infected patients [47, 48], is worrisome. Although the tetracyclines are an alternative choice, multidrug resistance, including resistance to these antibiotics, has been observed [48]. The rates of ampicillin resistance have been reported to be near 50% [9, 44, 49]; however, the rate of resistance to amoxicillin/clavulanate is low (∼2%) [9, 41, 44]. In our study, the outcome was favorable for the three patients who received amoxicillin/clavulanate. Although there are few data on the efficacy of this antibiotic for the treatment of campylobacter bacteremia, we believe that it may be a good alternative agent.

The optimal duration of antimicrobial therapy in patients with campylobacter bacteremia has not been well established [1–8, 34, 49]. In a healthy host in whom bacteremia may be discovered several days after blood cultures were performed, usually after complete recovery, no specific therapy is required. For healthy patients with sustained bacteremia or for compromised patients with bacteremia associated with acute gastroenteritis, a 10-day to 14-day course of antibiotics is probably sufficient. For compromised bacteremic patients without previous acute enteritis, particularly those with relapsing bacteremia, therapy should be more prolonged (at least 3 weeks). Patients with endovascular infections require at least 4 weeks of therapy.

In conclusion, the results from our series confirm those in other reports showing that campylobacter bacteremia is an uncommon disease that occurs mainly in patients with underlying illnesses and some form of immunosuppression (17% of our patients had advanced HIV disease). Even though the majority of patients were immunocompromised, the mortality was low. Because of the high rate of resistance of Campylobacter species to the quinolones, these drugs should not be used as empirical treatment, at least in Spain. Although the macrolides remain the antibiotics of choice, amoxicillin/clavulanate has shown potential as an alternative therapy.

Acknowledgment

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References


