Yersinia enterocolitica Peritonitis

Yersinia enterocolitica bacteremia and sepsis generally occur in the setting of iron overload, desferrioxamine therapy, chronic liver disease, diabetes, or immunosuppression [1]. Y. enterocolitica peritonitis has been reported rarely [2–7]. We report a case of Y. enterocolitica peritonitis and describe an additional 11 cases reported in the literature.

A 66-year-old male alcoholic was admitted to Royal Melbourne Hospital with a 2-week history of jaundice, ascites, loss of appetite, and decrease in body weight. Three years before admission he had undergone gastrectomy for gastric carcinoma. He had marked nontender ascites and icterus, and he was afebrile and oriented. A CT scan of the abdomen revealed cirrhotic liver morphology. In addition, chronic liver disease was reflected in the abnormal hematology and biochemistry results. Therapeutic paracentesis was performed 3 days later to alleviate respiratory distress caused by the increasing ascites, and analysis of the aspirate revealed a WBC count of 50/mm³. A gram stain was negative for bacteria, and bacterial and fungal cultures were negative as well. Supportive therapy including a low-protein diet, dietary supplements, diuretics, and prednisolone was instituted. Ranitidine was administered as prophylaxis for peptic ulceration.

Hepatic failure gradually developed over 10 days, which culminated in the sudden onset of incoherence, abdominal tenderness, tachycardia, and hypotension. A differential count revealed elevated neutrophils. Blood was obtained for cultures, and aspiration of ascitic fluid was performed. Analysis of the aspirate revealed a WBC count of 1,140/mm³ (81% polymorphonuclear leukocytes), and the gram stain was again negative. Intravenous cefotaxime therapy was instituted empirically. Cultures of blood and ascitic fluid yielded a facultatively anaerobic, oxidase-negative, gram-negative bacillus, identified subsequently as Y. enterocolitica (serogroup O:5,27, biotype 3, indole negative). The organism was susceptible to cefotaxime, gentamicin, ciprofloxacin, piperacillin, and ceftazidime but resistant to ampicillin and cephalothin. The patient’s condition deteriorated, and he died 3 days later, 16 days after admission. He had received any blood transfusions.

We reviewed the literature and found 11 cases of Y. enterocolitica peritonitis, the characteristics of which are summarized in Table 1, along with our case. Ages of patients ranged from 4 to 72 years. There were eight cases of spontaneous bacterial peritonitis (SBP), all of which occurred in adults with chronic liver disease. In contrast, all four cases of secondary peritonitis were in children, at least three of whom had an enteric infection with Y. enterocolitica.

Most adults who develop SBP have alcoholic cirrhosis, whereas children usually develop SBP in the setting of nephrotic syndrome or postnephrotic cirrhosis [8]. Patients with Y. enterocolitica SBP included in our review demonstrated the following general pattern. All eight had ascites secondary to chronic liver disease, usually alcohol-induced cirrhosis. Y. enterocolitica SBP conforms to the general pattern of this condition, in which gram-negative enteric bacilli, usually Enterobacteriaceae, represent 69% of bacteria found in ascitic fluid cultures. Blood cultures were positive for Y. enterocolitica in three of nine cases. Treatment included antimicrobial agents to which it was assumed Y. enterocolitica would be susceptible. The mortality rate was 33% overall; all of those who died were adults with chronic liver disease, representing a mortality rate of 50% for those with SBP. This rate is consistent with those for patients with SBP due to other bacteria (i.e., 48%–57%) [8]. There are no data to suggest that mortality rates for SBP and bacteremia are greater than rates for those without bacteremia. However, it is noteworthy that of the seven patients for whom blood cultures were performed, two patients had positive blood cultures, and both of these patients died.

The four children with secondary peritonitis all survived. Three had primary enteric Y. enterocolitica infection and iron overload, a phenomenon frequently described [1, 7]. However, these three cases are unusual in that secondary infection usually results in bacteremia, sepsis syndrome, or nonperitoneal focal infections [1]. Most episodes of peritonitis associated with peritoneal dialysis are due to contamination of the dialysis catheter with common or altered skin flora consisting of gram-positive organisms. In rare instances, transmural migration of organisms through the intact intestinal wall can cause peritonitis in this situation. It would appear that this would be the most likely means of pathogenesis in a child who was undergoing peritoneal dialysis for hypoplastic kidneys [7].

Y. enterocolitica bacteremia is particularly prevalent among patients with iron overload who are undergoing long-term dialysis and has been attributed to defective neutrophil defense [1]. Iron overload was documented in six of the patients included in our review, and it is possible that other patients with cirrhosis in this series had increased liver iron burden. The dependence of Y. enterocolitica on iron and the propensity of the organism to cause infections in such settings are believed to be a function of the inability of most strains of this species to synthesize iron-binding compounds (siderophores); this is in contrast to most other Enterobac-
One patient in the iron-overload group was receiving desferrioxamine, a naturally occurring siderophore used to chelate iron and thus reduce iron stores; desferrioxamine therapy should be withheld [1].

The case reported herein is the second in which gastric resection has been implicated as a risk factor for the development of systemic yersiniosis [1].

The culture of Y. enterocolitica from the stomach to the bowel, where colonization and infection may occur and from where systemic infection may originate [10]. Similarly, gastric resection or the use of H₂-receptor antagonists (both relevant in our case) and the subsequent diminution of acid concentration could reduce host defenses and place such patients at increased risk for infection. Iron-dependent Y. enterocolitica serogroups O:3 and O:9 predominate in cases of peritonitis as in other forms of invasive yersiniosis. Serogroup O:5,27 has not been reported previously in association with this condition, nor has it been shown to be iron dependent [1].

The antimicrobial susceptibility pattern of Y. enterocolitica is similar to that for most Enterobacteriaceae, and 4-fluoroquinolones are generally recommended as treatment for systemic yersiniosis, despite the lack of controlled clinical trials [1]. Empirical therapeutic regimens for bacterial peritonitis usually include antibiotics to which Y. enterocolitica is susceptible. Guidelines for the specific treatment of Y. enterocolitica peritonitis are lacking; however, it would seem prudent to consider the use of quinolones in addition to, or in place of, empirical therapy, as indicated by clinical circumstances. Desferrioxamine therapy should be withheld [1].

References

Table 1. Characteristics of patients with Yersinia enterocolitica peritonitis.

<table>
<thead>
<tr>
<th>Reference</th>
<th>Age (y)/sex</th>
<th>Underlying condition</th>
<th>BC</th>
<th>FC</th>
<th>Serogroup</th>
<th>Antimicrobial agent (iv)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>[2]</td>
<td>47/M</td>
<td>CR, gastrectomy</td>
<td>+</td>
<td>ND</td>
<td>5,27</td>
<td>Ctx, Gm</td>
<td>Died</td>
</tr>
<tr>
<td>[5]</td>
<td>62/M</td>
<td>HC, FE</td>
<td>–</td>
<td>–</td>
<td>0</td>
<td>Dox*</td>
<td>Survived</td>
</tr>
<tr>
<td>[6]</td>
<td>26/M</td>
<td>CR, FE</td>
<td>–</td>
<td>–</td>
<td>0</td>
<td>Ctx</td>
<td>Survived</td>
</tr>
<tr>
<td>[7]</td>
<td>10/M</td>
<td>PD, renal failure</td>
<td>–</td>
<td>ND</td>
<td>3</td>
<td>NA</td>
<td>Survived</td>
</tr>
<tr>
<td>[8]</td>
<td>37/M</td>
<td>CR, AIDS, FE</td>
<td>–</td>
<td>–</td>
<td>NA</td>
<td>Ox*</td>
<td>Survived</td>
</tr>
<tr>
<td>[9]</td>
<td>47/M</td>
<td>CR, gastrectomy</td>
<td>+</td>
<td>ND</td>
<td>5,27</td>
<td>Ctx</td>
<td>Died</td>
</tr>
<tr>
<td>[PR]</td>
<td>66/M</td>
<td>CR, gastrectomy</td>
<td>+</td>
<td>ND</td>
<td>5,27</td>
<td>Ctx</td>
<td>Died</td>
</tr>
</tbody>
</table>

NOTE. AP = appendicitis; BC = bacterial culture; Cfox = cefoxitin; Chl = chloramphenicol; CR = cirrhosis; Ctx = cefotaxime; Dox = doxycycline; DS = desferrioxamine therapy; FC = fecal culture; FE = documented iron overload; Gm = gentamicin; HC = hemochromatosis; MA = mesenteric adenitis; NA = not available; ND = not done; Net = netilmicin; Ox = oxacillin; PD = peritoneal dialysis; PR = present report; Sbm = streptomycin; Tet = tetracycline; TI = thalassemia intermedia; TM = thalassemia major; + = positive; = = negative.

* Administered orally.

† Adult, age not available.