Listeriosis in a Patient Undergoing Hemodialysis: A Case Report and Review of the Literature

Bir Hemodiyaliz Hastasında Listeriosis: Olgu Sunumu ve Literatür İnceleme

ABSTRACT

Listeria monocytogenes (L. monocytogenes) infection is an uncommon manifestation in patients with chronic renal failure. In this article, we present a case of L. monocytogenes bacteraemia in a patient undergoing hemodialysis. In addition, we are also present the listeriosis cases in hemodialysis patients reported so far in the literature. The patient was a 58-year-old man who was undergoing hemodialysis and had been admitted to hospital with fever. On the 5th day of admission, L. monocytogenes was detected in his blood cultures. He responded dramatically to ampicillin treatment. Listeriosis is a disease that requires careful microbiological laboratory examination. If the patient cultures are not analyzed carefully, the disease can be misdiagnosed. Only early diagnosis and adequate treatment can ensure a good prognosis.

KEY WORDS: Chronic renal failure, Hemodialysis, Listeria monocytogenes, Listeriosis

INTRODUCTION

Infections due to Listeria monocytogenes (L. monocytogenes) are relatively rare in the general population (1,2). It is an important bacterial pathogen in neonates, older adults, pregnant women, immunosuppressed patients, and patients with predisposing disorders (1,2). L. monocytogenes causes a self-limited febrile gastroenteritis in normal hosts, and invasive disease including sepsis and central nervous system infection in immunosuppressed patients (1,3).

L. monocytogenes infection is an uncommon manifestation in patients with chronic renal failure (CRF). In this article, we present a case of L. monocytogenes bacteraemia in a hemodialysis patient who then improved rapidly with Ampicillin monotherapy. We also present the listeriosis cases in hemodialysis patients reported so far in the literature.

CASE REPORT

A 58-year-old man presented to the emergency department at Baskent University Adana Hospital with a complaint of fever. He was undergoing hemodialysis three times a week since 2009 via a native arteriovenous fistula. His medical history...
included type 2 diabetes mellitus, hypertension, atherosclerotic heart disease, and left hemiparesis due to cerebrovascular events. The patient had also undergone an operation for diabetic foot where the 2nd, 3rd, 4th fingers of left lower extremity had been amputated. The patient also had an ICD (Implantable Cardiac Defibrillator) placed due to ventricular fibrillation unresponsive to cardioversion.

On physical examination, his blood pressure was 100/60 mmHg, and his temperature was 38.5 °C. Neurological examination revealed isochoric pupils, left upper and lower extremity weakness of 4/5, and no stiffness of the neck.

Evaluation during admission revealed he was anuric (24-hour urine volume 100 ml), and serum testing showed blood urea nitrogen 34 mg/dL, serum creatinine 5.9 mg/dL, sodium 137 mEq/L, potassium 4.2 mEq/L, calcium 7.7 mg/dL, phosphorus 4.6 mg/dL, and creatine kinase 62.00 IU/. His peripheral white blood cell count was 10,800 /mm³, and a differential count showed 78% neutrophils, 14.1% eosinophils, 8.4% lymphocytes, 5.6% monocytes and 0.5% basophils. Sedimentation rate was 109 mm/h, C-Reactive Protein 166 mg/L, procalcitonin 3 ng/mL. The measured means of two values of ferritin and transferrin saturation were 794 ng/mL and 25% in the last 6 months, respectively. There were no signs of infective endocarditis on transthoracic echocardiography. Chronic atrophic changes were seen in the cranial CT with contrast. There were no pathological findings in the thoracoabdominal CT. We could not find any origin of fever in his systemic review.

After obtaining blood cultures, empirical antibiotic treatment with ceftriaxone IV 2 g daily was started. His fever continued throughout ceftriaxone treatment. On the 5th day of the patient’s admittance, *L. monocytogenes* was identified in blood cultures according to the microbiological methods described below. Ceftriaxone treatment was switched to IV Ampicillin 6 g daily dose, (50% reduced dose for renal failure), and continued for 3 weeks. The patient responded dramatically to ampicillin treatment within 72 hours. His control blood culture for *L. monocytogenes* was negative. On the 26th day (5 days ceftriaxone + 21 days ampicillin), the patient was discharged from the hospital.

Three months after discharge, the patient underwent surgery for left below knee amputation. This time, Methicillin resistant- Staphylococcus aureus was detected in his blood cultures but no *L. monocytogenes* was seen. Six months after the episode of listeriosis, the patient died from acute cerebral infarction.

**MICROBIOLOGICAL METHODS**

Two blood cultures were monitored with the BACTEC 9240 device (BD Diagnostic, Maryland, USA). The cultures yielded catalase positive, gram-positive bacilli on the 4th day of cultivation. On blood agar plates, small haemolytic colonies grew and were stained as Gram-positive bacilli. The isolate was identified as *L. monocytogenes* by using the BBL Crystal identification kit (BD Diagnostic, Maryland, USA) and found susceptible to all tested antibiotics (erythromycin, gentamicin, penicillin, trimethoprim sulphamethoxazole, vancomycin, teicoplanin) by the disk diffusion test.

**DISCUSSION**

There is no clinical way to distinguish listeriosis from a number of other infectious diseases that manifest with fever and other constitutional symptoms. Adults with listeriosis typically present with fever, chills, headache, backache, and, myalgia (1,4). Our patient had no complaints other than fever.

The fatality rate is 38% in patients with underlying disease (5). The mortality rate is high (30%) in patients with kidney disease (2, 6).

The diagnosis of listeriosis can only be established by culture of the organism from normally sterile clinical specimens and identification of the organism through standard microbiological techniques (1). Listeriosis is a disease that requires careful microbiological laboratory examination. *L. monocytogenes* is seen as an irregular gram-positive bacilli, and stains as a diphtheroid with gram stain. Therefore, if the cultures are not analyzed carefully, it can be misdiagnosed. It can be often interpreted as skin flora contamination. Correct diagnosis requires the clinician’s awareness of listeriosis. The isolation of a “diphtheroid” from blood should always alert the physicians to the possibility that the organism is *L. monocytogenes*.

A few cases of listeriosis have been reported in patients with CRF between 1973 and 2011. We were not able to find any more recent cases in the literature. We are attributing this to three factors; listeriosis being a rare disease, common use of antibiotics before obtaining culture and microbiologists and physicians not being alert to listeriosis. Table I shows the previously reported cases of listeriosis in patients undergoing hemodialysis in the literature. We were able to find only 16 published listeriosis cases undergoing hemodialysis so far (4, 7-14) and 14 listeria peritonitis cases in patients undergoing peritoneal dialysis (7, 15-26).

For listeriosis cases with CRF in Table I, the most common patient complaint is listed as high fever while rash, confusion, weakness, myalgia, nausea and diarrhea have been reported with much less frequency (4,5,7-14). In hemodialysis patients, although rare, AVF fistula infection, endocarditis and central nervous system involvement have been also reported due to listeriosis (4,5,7,10,11). When these incidents are further analyzed, the most prominent cause of mortality is observed to be central nervous system involvement. Besides the CRF, co-morbid diseases, age and treatment protocols seem to have similar impacts on mortality.

This patient represents the first case of *L. monocytogenes* bacteremia in our institution among 1229 HD patients treated a period of 5 years. Iron is an important virulence factor for *L.
Table I: Summary of data from cases of Listeriosis in patients undergoing hemodialysis.

<table>
<thead>
<tr>
<th>Case No</th>
<th>Year of Reported</th>
<th>Reference</th>
<th>Age (Y) / Gender</th>
<th>Presentation</th>
<th>Underlying Disease</th>
<th>Source of L. monocytogenes</th>
<th>Treatment</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1973</td>
<td>6</td>
<td>27/F</td>
<td>Fever, Endocarditis</td>
<td>**</td>
<td>Blood Culture</td>
<td>Ampicillin</td>
<td>Improved</td>
</tr>
<tr>
<td>2</td>
<td>1973</td>
<td>6</td>
<td>69/M</td>
<td>Fever, Endocarditis, Vascular Access Infection</td>
<td>**</td>
<td>Blood Culture</td>
<td>Ampicillin</td>
<td>Died</td>
</tr>
<tr>
<td>3</td>
<td>1981</td>
<td>14</td>
<td>47 / M</td>
<td>Fever, Apathy</td>
<td>**</td>
<td>Blood And CSF</td>
<td>Penicillin G</td>
<td>Died</td>
</tr>
<tr>
<td>4</td>
<td>1981</td>
<td>14</td>
<td>54 / F</td>
<td>Fever and Chills</td>
<td>**</td>
<td>Blood</td>
<td>Cephalosporin</td>
<td>Improved</td>
</tr>
<tr>
<td>5</td>
<td>1981</td>
<td>4</td>
<td>45 / M</td>
<td>*</td>
<td>**</td>
<td>Blood and Stool</td>
<td>Penicillin G</td>
<td>Improved</td>
</tr>
<tr>
<td>6</td>
<td>1981</td>
<td>4</td>
<td>18 / M</td>
<td>Fever and Confusion</td>
<td>SLE</td>
<td>Blood and CSF</td>
<td>Chloramphenicol + Gentamicin</td>
<td>Died</td>
</tr>
<tr>
<td>7</td>
<td>1982</td>
<td>5</td>
<td><em>/</em></td>
<td>Fever and AVF Dysfunction</td>
<td>**</td>
<td>Blood and AVF Graft</td>
<td>Vancomycin</td>
<td>Improved</td>
</tr>
<tr>
<td>8</td>
<td>1984</td>
<td>7</td>
<td>54 / F</td>
<td>Fever, Chills, Weakness, Pain in Shoulders, Pericarditis, Splenectomy, CGN</td>
<td>Blood and Pericardial Fluid</td>
<td>Pen Allergy +, Cephalosporin, Erythromycin</td>
<td>Improved</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1985</td>
<td>8</td>
<td>56/F</td>
<td>Fever, Malaise, Chills</td>
<td>Iron Overload</td>
<td>Blood</td>
<td>Vancomycin + Gentamicin</td>
<td>Died</td>
</tr>
<tr>
<td>10</td>
<td>1985</td>
<td>8</td>
<td>36/F</td>
<td>Fever, Malaise, Chills, Myalgias</td>
<td>Iron Overload, CGN Unsuccessful Transplantation</td>
<td>Blood</td>
<td>Vancomycin + Gentamicin</td>
<td>Improved</td>
</tr>
<tr>
<td>11</td>
<td>1985</td>
<td>8</td>
<td>28/F</td>
<td>Fever, Chills, Fatigue, Malaise</td>
<td>Iron Overload, FSGS</td>
<td>Blood</td>
<td>Pen Allergy +Vancomycin</td>
<td>Improved</td>
</tr>
<tr>
<td>12</td>
<td>1985</td>
<td>8</td>
<td>61/F</td>
<td>Fever, Malaise, Chills, Myalgias, Diarrhea</td>
<td>Rheumatoid Arthritis, Corticosteroid</td>
<td>Blood</td>
<td>Vancomycin + Gentamicin</td>
<td>Improved</td>
</tr>
<tr>
<td>13</td>
<td>1986</td>
<td>9</td>
<td>69/F</td>
<td>No Fever, Endocarditis, Vascular Access Infection</td>
<td>**</td>
<td>Blood</td>
<td>Vancomycin + Gentamicin</td>
<td>Improved</td>
</tr>
<tr>
<td>14</td>
<td>1990</td>
<td>10</td>
<td><em>/</em></td>
<td>*</td>
<td>IV Drug Abuser-HIV Positive, Iron Overload</td>
<td>Blood and CSF</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>15</td>
<td>1998</td>
<td>11</td>
<td>69 / M</td>
<td>Fever, Abdominal Pain, Nausea, Diarrhea</td>
<td>Obstructive Uropathy</td>
<td>Ascitic Fluid</td>
<td>Ampicillin + Gentamicin, Vancomycin</td>
<td>Improved</td>
</tr>
<tr>
<td>16</td>
<td>2007</td>
<td>12</td>
<td>69 / M</td>
<td>Fever, Chills</td>
<td>Iron Overload</td>
<td>Blood</td>
<td>Ampicillin-sulbactam</td>
<td>Improved</td>
</tr>
</tbody>
</table>

SLE: Systemic lupus erythematosus, CGN: Chronic glomerulonephritis, CSF: Cerebrospinal fluid
*Not known  **No additional disease except for chronic renal failure
**CONCLUSION**

Fever of unknown origin or Diphtheroid growth in culture should alert physicians to consider the possibility of listeriosis as these can be distinguishing factors for accurate diagnosis, especially for patients undergoing hemodialysis. Only early diagnosis and adequate treatment can ensure a good prognosis.

**REFERENCES**