

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* bacteremia 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

ÖZ

Listeria monocytogenes (*L. monocytogenes*) enfeksiyonu, kronik böbrek yetmezliği olan hastalarda nadir görülen bir hastalıktır. Yazıda, *L. Monocytogenes*'e bağlı bakteriyemi saptanan bir hemodiyaliz hastası sunulmaktadır. Ek olarak literatürde günümüze dek bildirilmiş olan listeriosis'li hemodiyaliz hastaları da sunulmaktadır. Hemodiyalize girmekte olan 58 yaşında erkek hasta, ateş şikayeti ile hastaneye başvurdu. Yatışının 5. gününde kan kültürlerinde *L. monocytogenes* saptandı. Hasta ampisilin tedavisine dramatik olarak iyi cevap verdi. Listeriosis; mikrobiyoloji laboratuvarında dikkatli incelemeler sonucu teşhis edilebilen bir hastalıktır. Kültürler dikkatli incelenmez ise yanlış teşhis edilebilir. Ancak erken teşhis ve uygun tedavi ile prognozu iyidir.

ANAHTAR SÖZCÜKLER: Kronik böbrek yetmezliği, Hemodiyaliz, *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* bacteremia 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

Nihan TEKKARIŞMAZ¹
Rüya ÖZELSANCAK¹
Dilek TORUN¹
Hikmet Eda ALIŞKAN²

- 1 Başkent University, Faculty of Medicine, Department of Nephrology, Adana, Turkey
- 2 Başkent University, Faculty of Medicine, Department of Microbiology, Adana, Turkey



Received : 03.05.2016

Accepted : 06.08.2016

Correspondence Address:

Nihan TEKKARIŞMAZ

Başkent Üniversitesi Tıp Fakültesi,

Nefroloji Bilim Dalı, Adana, Turkey

Phone : +90 322 344 44 44

E-mail : nihan_torer@hotmail.com

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 Crystall

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.

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

SLE: Systemic lupus erythematosus, **CGN:** Chronic glomerulonephritis, **CSF:** Cerebrospinal fluid

*Not known **No additional disease except for chronic renal failure

monocytogenes, especially in hemodialysis patients (1). Ferritin and transferrin saturation are two serum measurements routinely employed for the diagnosis of iron overload. However, there was no iron overload in our patient. Cephalosporin has limited activity against *L. monocytogenes*. Ampicillin or penicillin G is the first drug of choice for listeriosis (1,4). Therefore, it is important to assess cultures for listeria to determine potential listeriosis and the optimal course of treatment in immunosuppressive patients. Once we determined our patient to have listeriosis, we switched antibiotic therapy to ampicillin treatment which is more effective for this type of pathogen.

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

1. Lorber B: Listeriosis. Clin Infect Dis 1997;24:1-11
2. Guevara RE, Mascola L, Sorvillo F: Risk factors for mortality among patients with nonperinatal listeriosis in Los Angeles County, 1992-2004. Clin Infect Dis 2009;48:1507
3. Ahmad M, Krishnan A, Kelman E, Allen V, Bargman JM: Listeria monocytogenes peritonitis in a patient on peritoneal dialysis: A case report and review of the literature. Int Urol Nephrol 2008;40:815-819
4. Skidmore AG: Listeriosis at Vancouver General Hospital, 1965-79. Can Med Assoc J 1981;125:1217-1221
5. Zeitlin J, Carvounis CP, Murphy RG, Tortora GT: Graft infection and bacteremia with listeria monocytogenes in a patient receiving hemodialysis. Arch Intern Med 1982;142:2191-2192
6. Skogberg K, Syrjänen J, Jahkola M, Renkonen OV, Paavonen J, Ahonen J, Kontiainen S, Ruutu P, Valtonen V: Clinical presentation and outcome of listeriosis in patients with and without immunosuppressive therapy. Clin Infect Dis 1992;14:815-821
7. Gallagher PG, Watanakunakorn C: Listeria monocytogenes endocarditis: A review of the literature 1950-1986. Scand J Infect Dis 1988;20:359-368
8. Holoshitz J, Schneider M, Yaretzky A, Bernheim J, Klajman A: Listeria monocytogenes pericarditis in a chronically hemodialyzed patient. Am J Med Sci 1984;288:34-37
9. Mossey RT, Sondheimer J: Listeriosis in patients with long-term hemodialysis and transfusional iron overload. Am J Med 1985;79:397-400
10. Gallagher PG, Amedia CA, Watanakunakorn C: Listeria monocytogenes endocarditis in a patient on chronic hemodialysis, successfully treated with vancomycin-gentamicin. Infection 1986;14:125-128
11. Calubiran OV, Horiuchi J, Klein NC, Cunha BA: Listeria monocytogenes meningitis in a human immunodeficiency virus-positive patient undergoing hemodialysis. Heart Lung 1990;19:21-23
12. Read RC, Vilar FJ, Smith TL: Peritonitis due to Listeria monocytogenes in a patient receiving maintenance hemodialysis. Clin Infect Dis 1998;26:514-516
13. Seeger W, Hugo F, Heine C, Handrick W: Listeriosis in a patient with hemodialysis and iron overload. Med Klin (Munich) 2007;102:483-485
14. Maayan MC, Wajzman C, Nitzan Y: Meningitis and bacteraemia due to Listeria monocytogenes in compromised hosts. Postgrad Med J 1981;57:77-79
15. Ahmad M, Krishnan A, Kelman E, Allen V, Bargman JM: Listeria monocytogenes peritonitis in a patient on peritoneal dialysis: A case report and review of the literature. Int Urol Nephrol 2008;40:815-819
16. Myers JP, Peterson G, Rashid A: Peritonitis due to Listeria monocytogenes complicating continuous ambulatory peritoneal dialysis. J Infect Dis 1983;148:1130
17. Allais JM, Cavalieri SJ, Bierman MH, Clark RB: Listeria monocytogenes peritonitis in a patient on continuous ambulatory peritoneal dialysis. Nebr Med J 1989;74:303-305
18. Korzets A, Andrews M, Campbell A, Feehally J, Walls J, Prentice M: Listeria monocytogenes peritonitis complicating CAPD. Perit Dial Int 1989;9:351-352
19. al-Wali WI, Baillod R, Hamilton-Miller JM, Kyi MS, Brumfitt W: Listeria monocytogenes peritonitis during continuous ambulatory peritoneal dialysis (CAPD). Postgrad Med J 1990;66:252
20. Hart KA, Reiss-Levy EA, Trew PA: Listeria monocytogenes peritonitis associated with CAPD. Med J Aust 1991;154:59-60
21. Dryden MS, Jones NF, Phillips I: Vancomycin therapy failure in Listeria monocytogenes peritonitis in a patient on continuous ambulatory peritoneal dialysis. J Infect Dis 1991;164:1239
22. Lunde NM, Messana JM, Swartz RD: Unusual causes of peritonitis in patients undergoing continuous peritoneal dialysis with emphasis on listeria monocytogenes. J Am Soc Nephrol 1992;3:1092-1097
23. Banerji C, Wheeler DC, Morgan JR: Listeria monocytogenes CAPD peritonitis: Failure of vancomycin therapy. J Antimicrob Chemother 1994;33:374-375
24. Tse KC, Li FK, Chan TM, Lai KN: Listeria monocytogenes peritonitis complicated by septic shock in a patient on continuous ambulatory peritoneal dialysis. Clin Nephrol 2003;60:61-62
25. Bierhoff M, Krutwagen E, van Bommel EFH, Verburgh CA: Listeria peritonitis in patients on peritoneal dialysis: Two cases and a review of the literature. Neth J Med 2011;69:461-464
26. Benjelloum O, Sánchez Álvarez JE, Rodríguez Suárez C, González I, Fernández-Viña A, Núñez M, Peláez B: Listeria monocytogenes: An infrequent cause of peritonitis in peritoneal dialysis. Nefrologia 2011;31:362-365