

Two Cases of Spinal Epidural Abscess in Hemodialysis Patients

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While epidural abscesses are rare in hemodialysis patients, they can cause severe neurological complications that can be fatal because only nonspecific symptoms appear in the early stages of the infection. Their incidence increased recently due to intravenous drug abuse, invasive spinal surgery, percutaneous vertebral procedures, and the development of diagnostic modalities. The increased number of cases is related to the use of dialysis catheters in hemodialysis patients. If a patient has fever and back pain, doctors should eliminate the possibility of other common diseases and consider spinal epidural infection. Early diagnosis and proper treatment are important to prevent neurological complications. In this paper, the symptoms, blood work, magnetic resonance imaging (MRI) findings, and clinical course of two hemodialysis patients who developed spinal epidural abscesses are described.

Key Words: Epidural abscess, Hemodialysis, Low back pain

INTRODUCTION

Spinal epidural abscess is a rare condition with an incidence rate of 0.2-2 persons per 10,000 hospitalized persons. It can cause neurological complications and is potentially fatal because it initially presents only with nonspecific symptoms, due to which early diagnosis is not easy. Although spinal epidural abscesses occur more rarely in hemodialysis patients, recently, their frequency has been increasing. We encountered 2 cases of epidural abscesses in hemodialysis patients, and reported these cases together with a literature review.

CASES

Case 1

A 68-year-old woman presented to our hospital with a

scalp laceration, which occurred when she fell down due to sudden systemic weakness. She was diagnosed with obstructive uropathy 30 years ago, and had been receiving hemodialysis since June 2010. She was hospitalized in the Department of Nephrology of our hospital because she exhibited pyrexia, mental deterioration, a drop in blood pressure, and deterioration of systemic conditions. The occipital region of her scalp showed two 3-cm-long subcutaneous lacerations, although neurological examinations did not reveal any significant findings. She had an arteriovenous fistula on her left arm, but there was no pain or tenderness. A peripheral blood test conducted in the emergency room showed the following values: white blood cells (WBCs) $15,660/\text{mm}^3$, polymorphonuclear leukocytes 88.4%, and lymphocytes 3.8%. The C-reactive protein (CRP) level was found to be 119.55 mg/dL. Since the WBC and CRP levels were high, the blood was cultured to rule out the possibility of infection. A brain computed tomography (CT) was carried out to check for cerebral hemorrhage; however, aside from the chronic lacunar infarction, the CT did not reveal any significant findings. Levofloxacin was administered as an empirical antibiotic treatment for suspected infection. However, following this, blood culture tests gave positive results for methicillin-resistant *Staphylococcus aureus* (MRSA); therefore, levofloxacin was replaced with vanco-

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Fig. 1. 68-year-old woman with epidural abscess. T1-weighted (A) and T2-weighted (B) MR images showing spondylodiscitis with anterior epidural abscess formation at the T10-11 level (arrow).

mycin. The patient started experiencing gradually increasing low back pain 2 months after admission; therefore, a lumbar magnetic resonance imaging (MRI) was carried out, which revealed epidural abscesses in a region anterior to the thoracic vertebrae (T10-11) (Fig. 1A, 1B). Fine-needle aspiration biopsy was attempted but failed because the region was too small and located in the vertebral column. On the seventieth day of hospitalization, the patient died after her systemic conditions deteriorated.

Case 2

A 67-year-old woman presented with low back pain and pyrexia for 3 days before visiting the hospital. She had taken analgesics due to low back pain, but her condition did not improve. Pyrexia, cold sweating, delirium, and gait disturbances had commenced 2 days prior to her hospital visit. Six months before her hospital visit, she was diagnosed with chronic kidney disease due to diabetic nephropathy and had been receiving hemodialysis since. There was a central venous catheter on the right side, but no pain or tenderness was present. A peripheral blood test conducted in the emergency room showed the following findings: 14,850 WBCs/mm³, 82% polymorphonuclear leukocytes, 3% lymphocytes, and 8% stab cells. The CRP level was 315 mg/dL. Since the WBC and CRP levels were high, the blood was cultured to rule out the possibility of infection. Lumbar MRI revealed anterior and posterior epidural abscesses in the lumbar region (L4-5) (Fig. 2A, 2B). The central venous catheter was replaced, and meropenem and vancomycin were administered in case of severe infection. However, blood culture tests were positive

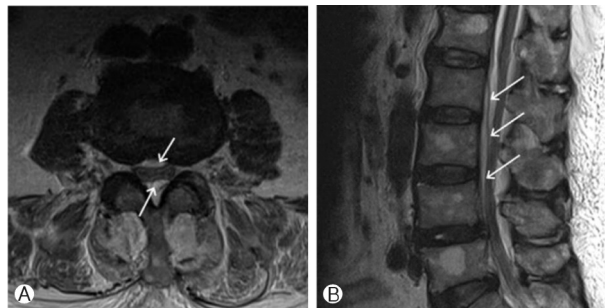


Fig. 2. 67-year-old woman with epidural abscess. T2-weighted axial (A) and sagittal (B) MR images showing anterior and posterior epidural abscesses through L-spines causing thecal sac compression (arrows).

for oxacillin-susceptible *S. aureus*; therefore, the antibiotic was replaced with cefazolin. After 1 month of antibiotic therapy, MRSA culture results were obtained, and there were no reductions in pyrexia and CRP levels. The antibiotic was replaced again, and this time with vancomycin. Fine-needle aspiration biopsy was conducted to diagnose and treat the epidural abscesses diagnosed through the lumbar MRI. However, since the abscesses were not yet completely liquefied, only 0.5 cc was aspirated, and the bacterial culture tests were negative. After treatment with vancomycin for 8 weeks, the patient was free of pyrexia and her pain was relieved. She is now undergoing rehabilitation.

DISCUSSION

Epidural abscess can invade the brain or the spinal cord, resulting in potentially fatal neurological damage.¹ It occurs more frequently in patients with diabetes, intravenous drug abuse, tumors, HIV, and in patients who receive immunosuppressive therapy or have acquired immune deficiency syndrome or chronic kidney disease. Further, patients with spinal disorders such as degenerative joint disease and scoliosis are also vulnerable to the infection.²⁻⁴

Spinal epidural spaces are consecutive vertical spaces largely filled with fat that can be easily infected, arteries, and venous plexuses divided into an anterior space and a posterior space. The posterior space is narrow at the cervical region and wide in the thoracic (T4-8) and lumbar regions (L3-S2). Due to this structure, the location and expansion of epidural abscesses can be determined.^{2-3,5}

Bacteria normally infiltrate epidural spaces via one of 3 routes: by inflammation spreading from adjacent organs,

causing conditions such as vertebral osteomyelitis or psoas muscle inflammation; by hematogenous propagation of skin, soft tissue, and the urinary or respiratory system; and via invasive routes such as surgery, lumbar puncture, and epidural anesthesia.² Although rare, infection in hemodialysis patients occurs in the central venous catheters used for dialysis, spreading to become epidural inflammation.^{1,3,5-6}

The most common bacteria found in epidural abscesses are gram-positive bacteria and staphylococci, which account for 50-66% of all such bacteria. Further, *Escherichia coli*, the influenza virus, and *Proteus vulgaris* have also been found, albeit rarely.^{1,6} In hemodialysis patients, staphylococcal infections frequently occur because central venous catheters inserted for dialysis become infection sources; specifically, staphylococcal bacteremia is known to be related to serious morbidity and mortality rates.⁷ MRSA accounts for only approximately 15% of spinal epidural staphylococcal infections reported over the last 10 years, but the frequency has been rapidly increasing.

The 3 typical signs of spinal epidural abscess are low back pain, pyrexia, and progressive neural symptoms.^{2,3,6} However, these symptoms rarely appear together, and no single clinical symptom appears only in this condition. Thus, it is frequently misdiagnosed in the first medical examination.⁸ Since epidural abscesses cause severe neurological damage in the thoracic or lumbar vertebrae in at least 50% of cases, early diagnoses and treatment are vital in preventing neurological damage.^{3,6,8}

Although epidural abscesses can be diagnosed on the basis of clinical conditions, blood tests, and imaging, when a patient has low back pain or other neurological symptoms, the clinician must first suspect spinal epidural abscesses.⁴ This condition can be diagnosed early with an MRI because T1-enhanced images reveal distinctive decreases in the signal intensity of the vertebral body, and T2-enhanced images reveal findings such as increased signal intensity of discs.

Surgical methods are preferred over conservative antibiotic therapy alone, but the latter can be attempted if progress is carefully monitored in the early stages without neurological damage.⁵ While waiting for culture results, broad-spectrum antibiotics should be used to treat staphylococcus infection; in particular, if MRSA infection is suspected, vancomycin should be used. Antibiotics should be administered for at least 6 weeks because epidural abscess is often accompanied by spinal osteomyelitis. Therefore, intravenous antibiotic treatment is preferred over oral medication.³

Despite current developments of diagnostic and therapeutic

technologies, the morbidity and mortality rates of epidural abscesses are extremely high.⁵ Early diagnosis, identification of specific strains, and early treatment can improve the prognosis. With optimal treatment, recurrence rates are around 0-4%, and clinical or radiological follow-ups suggest that recurrences are generally reported at 12 months. Therefore, WBC, CRP, and erythrocyte sedimentation rate (ESR) tests and MRIs should be continuously performed until symptoms disappear or stabilize. The prognosis relies on the time from the appearance of neurological symptoms and the diagnosis, the standard being 36 hours.⁹ Our first patient was diagnosed after 36 hours, and showed poor progress and eventual death, while the second patient was diagnosed within 36 hours through MRI, antibiotic treatment was immediately started, and the patient was cured without any neurological complications.

We report 2 cases of epidural abscesses in hemodialysis patients. In the event that patients who receive hemodialysis report pyrexia and low back pain, after eliminating other common causes, it is vital for the prognosis to investigate the possibility of epidural infection to diagnose and adequately treat the disease at an early stage.

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