



Metastatic Staphylococcus Aureus Infection in a Haemodialysis Patient Bir Hemodiyaliz Hastasında Metastatik Staphylococcus Aureus Enfeksiyonu

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ABSTRACT

Methicillin-resistant Staphylococcus aureus (MRSA) causes invasive infections that are difficult to treat and associated with high mortality rates due to antibiotic resistance. Frequent hospital admissions, antibiotic use, invasive catheters, and hemodialysis are significant risk factors for MRSA infections. Here, we report a case of a hemodialysis patient with pneumonia and bacteremia caused by MRSA. The patient presented with tenderness at the catheter insertion site, elevated acute-phase reactants in laboratory tests, and lung consolidations. Removal of the infected catheter and administration of appropriate antibiotic therapy resulted in complete resolution of the patient's clinical symptoms and laboratory abnormalities. This case highlights the importance of recognizing that catheter-related bacteremia in hemodialysis patients can lead to metastatic infections and necessitates careful screening.

Keywords: Haemodialysis, pneumonia, staphylococcus aureus

ÖZET

Metisiline dirençli Staphylococcus aureus (MRSA), antibiyotik direnci nedeniyle tedavisi zor ve yüksek ölüm oranlarına sahip invaziv enfeksiyonlara neden olmaktadır. Sık hastaneye yatış, antibiyotik kullanımı, invaziv kateterler ve hemodiyaliz MRSA enfeksiyonları için risk faktörleridir. Burada, MRSA'nın etken olduğu pnömoni ve bakteriyemisi olan bir hemodiyaliz hastası bildirilmektedir. Hastada kateter girişi yerinde hassasiyet, laboratuvar değerlerinde akut faz reaktanlarında yükseklik ve akciğerde konsolidasyonlar saptanmıştır. Enfekte kateterin çekilmesi ve uygun antibiyotik tedavisi ile hastanın klinik ve laboratuvar bulgularında tam düzelme sağlanmıştır. Bu vaka, hemodiyaliz hastalarında kateter kaynaklı bakteriyemilerin metastatik enfeksiyonlara yol açabileceğini ve dikkatli bir tarama gerektirdiğini hatırlatmaktadır.

Anahtar Kelimeler: Hemodiyaliz, pnömoni, staphylococcus aureus

INTRODUCTION

Staphylococcus aureus is a gram-positive bacterium that resides within the nasal passages of about 20-40% of people. This prevalence can vary based on population demographics, sample size, and the methods used in sampling and culturing. Under normal circumstances, S. aureus exists harmlessly as part of the body's microbiota (1,2). However, it can invade deeper tissues or enter the bloodstream when the skin or mucosal barriers are compromised, such as through skin wounds, chronic dermatologic conditions, or post-surgical sites. It causes infections with high mortality rates in people with weakened immune systems or those using invasive medical

devices such as central and peripheral venous catheters (3). Methicillin-resistant S. aureus (MRSA) was first reported in the United Kingdom in 1961, shortly after methicillin's introduction to clinical use, and quickly became a cause of hospital-associated outbreaks (HA-MRSA) across various regions (4). Risk factors for MRSA infection were defined as prolonged hospital or intensive care unit stay, frequent antibiotic use, invasive procedures, nursing home, hospice stay, wounds, hemodialysis and long-term central venous catheters or urinary catheters, body colonization with MRSA. Despite advances in antibiotic therapy, invasive S. aureus infections are associated with serious

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Cite this article as: Eren D, Tatar O, Koyuncu S. Metastatic Staphylococcus Aureus Infection in a Haemodialysis Patient. JAMER 2025;10(3):96-98.

Received: 30.12.2024

Accepted: 07.10.2025

Online Published: 31.12.2025

complications, recurrence and mortality (5). In addition, metastatic events are events that increase the morbidity of MRSA infections. MRSA causes complicated infections in haemodialysis patients due to antibiotic resistance and biofilm layers (6).

Here we report a patient with chronic renal failure and multifocal Staphylococcus aureus infection.

CASE REPORT

A 68-year-old woman admitted to Kayseri City Hospital Emergency Service with malaise, fever and anorexia

for a week. The patient was undergoing hemodialysis through a jugular venous catheter twice a week. Physical examination revealed tenderness where the catheter was inserted, but there was no sign of infection or discharge. Lung examination revealed diminished breath sounds. Laboratory tests showed elevated levels of C-reactive protein (CRP) at 146.5 mg/L, white blood cells (WBC) at $22.43 \times 10^3/\mu\text{L}$, and neutrophils at $18.45 \times 10^3/\mu\text{L}$. Chest X-ray (Figure 1) revealed multiple consolidations, prompting a follow-up thoracic computed tomography (CT) scan (Figure 2). Cultures were taken from the catheter site, blood, and urine. Considering that the patient was



Figure 1. Chest radiography

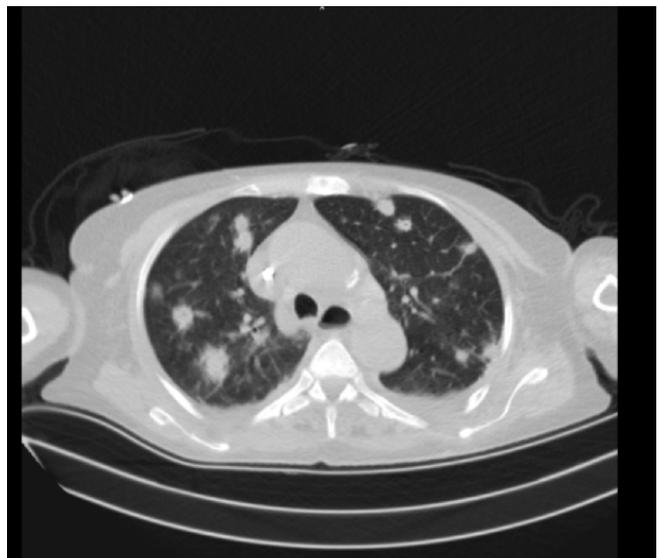


Figure 2. Chest computed tomography

Table 1. Peripheral blood culture antibiogram.

Antibiogram	Susceptible	Mid-Susceptible	Resistant	MIC
Clindamycin	+			0,25
Erythromycin	+			0,5
Linezolid	+			2
Methicillin	+			
Trimethoprim/ Sulfamethoxazole	+			<=10
Vancomycin	+			1

Table 2. Catheter culture antibiogram.

Antibiogram	Susceptible	Mid-Susceptible	Resistant	MIC
Benzympenicillin			+	0,12
Clindamycin	+			0,25
Erythromycin	+			1
Linezolid	+			2
Methicillin			+	
Trimethoprim /Sulfamethoxazole	+			<=10
Vancomycin	+			1

recently hospitalized and received cefuroxime treatment, cefepime and vancomycin were started at doses adjusted according to renal function. Blood cultures identified methicillin-sensitive Staphylococcus aureus (MSSA) (Table 1), while methicillin-resistant S. aureus (MRSA) was isolated from the catheter (Table 2). Urine culture yielded no bacterial growth. Based on these findings, vancomycin therapy was continued. An echocardiogram showed no signs of infective endocarditis. Additional CT scans of the thoracic and lumbar spine ruled out spondylodiscitis. The patient’s catheter was subsequently removed, and her CRP and WBC levels gradually improved. After two weeks of treatment, the patient was discharged.

DISCUSSION

Over the past two decades, the incidence of Staphylococcus infections has increased significantly. Aureus infections—both community-acquired and hospital-associated—have risen significantly, largely due to the increased use of invasive devices. MRSA is a major contributor to

frequently used in urgent hemodialysis cases where permanent access is not available, increase the risk of bloodstream infections (BSIs) and are associated with complications like endocarditis and septic arthritis (9).

CVCs are source of bacteremia and invasive infections due to biofilms secreted by *S. aureus*. Staphylococcus aureus infections involving biofilm formation are especially challenging to treat, as biofilms protect bacteria from both antibiotics and immune defenses (10). Biofilms facilitate resistance by allowing gene transfer among bacteria. In clinical settings, *S. aureus* often forms biofilms on catheter surfaces and implanted devices, necessitating their removal and replacement to ensure effective treatment (11). Adhering to aseptic techniques during catheter insertion, as outlined in international guidelines, significantly reduces infection risks. Proper infection control measures are crucial for improving care quality and reducing infection rates in hemodialysis patients (12).

Conclusion

Catheter-associated infections represent a significant risk for patients undergoing hemodialysis via central venous catheters. Despite the effectiveness of catheter care, the risk of catheter-related infections persists. Adherence to antiseptic protocols during catheter placement and rigorous compliance with aseptic measures in catheter care are crucial in mitigating the risk of these infections. When such infections occur despite all preventive measures, skin flora elements should be primarily considered. MRSA, a frequent cause of catheter-associated infections, poses treatment challenges due to the protective biofilm layer it forms.

Additionally, in patients with MRSA infections, the risk of developing metastatic infections should not be overlooked. Therefore, in patients whose symptoms and infection parameters do not improve despite adequate treatment, metastatic infections (e.g., osteomyelitis, endocarditis) should be considered, and treatment should be expanded or prolonged accordingly. For patients experiencing recurrent catheter infections, alternative renal replacement therapy options should be considered. If it is deemed appropriate for the patient to continue hemodialysis, the option of creating an arteriovenous fistula should be evaluated.

Informed Consent: Written informed consent was obtained from the subject for the publication of the study.

Conflict of Interest: The authors declare no conflict of interest in this study.

Financial Disclosure: No financial support was received from any institution or organization for this study.

Author Contributions: Concept- D.,E., S.,K.; Design- D.,E. Supervision- S.,K. Resources- O.,T. Materials- D.,E., O.,T. Data Collection and/or Processing- D.,E. O.,T. Analysis and/or Interpretation- D.,E., O.,T. Literature Search- D.,E., S.,K. Writing Manuscript- D.,E., S.,K.

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