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Case Report

Invasive Fungal Infection in a Patient with Multiple Comorbidities: A Case Report and Therapeutic Review

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Abstract

Invasive fungal infections (IFIs) are a major cause of morbidity and mortality, particularly among hospitalized and immunocompromised patients. Prompt diagnosis and timely initiation of appropriate antifungal therapy are essential for improving clinical outcomes. We report the case of a 56-year-old man with type 2 diabetes mellitus and chronic kidney disease who presented with persistent fever, hypotension, and features of systemic infection. Blood cultures confirmed candidemia caused by Candida albicans, and antifungal susceptibility testing guided therapeutic management. The patient was successfully treated with intravenous micafungin followed by step-down oral fluconazole therapy, resulting in complete clinical recovery. This case highlights the importance of early recognition, susceptibility-guided antifungal treatment, source control measures, and individualized patient management in invasive candidiasis.

Keywords: Invasive fungal infection, Candidemia, Candida albicans, Antifungal therapy, Echinocandin, Micafungin, fluconazole, Chronic kidney disease

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Introduction

Invasive fungal infections are increasingly recognized as serious healthcare-associated infections, particularly among patients with compromised immunity and multiple comorbidities. Predisposing factors include prolonged hospitalization, central venous catheterization, broad-spectrum antibiotic exposure, neutropenia, diabetes mellitus, chronic kidney disease, and recent surgical interventions.

Among the various fungal pathogens, Candida species remain the leading cause of invasive fungal infections, while Aspergillus species and emerging multidrug-resistant fungi such as Candida auris continue to pose significant therapeutic challenges. The management of invasive fungal infections requires prompt diagnosis, appropriate antifungal selection, source control, and close monitoring for treatment efficacy and adverse effects.

Available antifungal agents include polyenes, azoles, echinocandins, and newer antifungal drugs targeting specific fungal pathways. Treatment decisions depend on pathogen identification, infection severity, susceptibility profiles, site of infection, and

patient-specific factors such as organ dysfunction.

This report describes the successful management of invasive candidiasis in a patient with diabetes mellitus and chronic kidney disease, emphasizing the role of early intervention and evidence-based antifungal therapy.

Case presentation

Patient history

A 56-year-old male was admitted with a five-day history of fever, chills, and progressive hypotension. His medical history was significant for type 2 diabetes mellitus, hypertension, and stage 3 chronic kidney disease. Two weeks prior to admission, he had undergone a minor gastrointestinal procedure and subsequently received broad-spectrum antibiotic therapy for a suspected bacterial infection.

Clinical examination

On admission, the patient appeared acutely ill. Vital signs revealed a temperature of 38.9°C, blood pressure of 88/56 mmHg, and heart rate of 112 beats per minute. Physical examination demonstrated mild pallor without focal signs of infection. The previous surgical incision was well-healed, with no evidence of erythema, discharge, or tenderness.

Laboratory investigations showed leukocytosis with a white blood cell count of 14,500/mm^3 and markedly elevated inflammatory markers, including a C-reactive protein level of 122 mg/L. Mild elevation of hepatic transaminases was also observed. Blood cultures were obtained, and empirical broad-spectrum antibacterial therapy was continued while the patient underwent evaluation for sepsis.

Investigations

Microbiological studies revealed growth of Candida albicans in blood cultures after 48 hours. Antifungal susceptibility testing demonstrated sensitivity to echinocandins and azoles, with intermediate susceptibility to fluconazole.

Radiological investigations, including chest radiography and abdominal ultrasonography, showed no evidence of abscess formation or invasive fungal lesions.

Renal function tests demonstrated a serum creatinine level of 2.1 mg/dL compared with a baseline value of 1.8 mg/dL, corresponding to an estimated glomerular filtration rate of 38 mL/min/1.73 m^2.

Based on the clinical presentation and microbiological findings, a diagnosis of invasive candidiasis presenting as candidemia was established.

Management

Therapeutic approach

Given the diagnosis of candidemia in the setting of chronic kidney disease and reduced susceptibility to fluconazole, intravenous micafungin at a dose of 100 mg daily was initiated as first-line therapy. In accordance with current management principles, all indwelling central venous catheters were removed to facilitate source control and reduce the risk of persistent bloodstream infection.

Clinical course

The patient demonstrated gradual clinical improvement, with resolution of fever occurring within 72 hours of initiating antifungal therapy. Repeat blood cultures obtained five days after treatment initiation were negative for Candida albicans, confirming microbiological clearance.

Renal function remained stable throughout treatment, and no significant adverse effects related to antifungal therapy were observed. After completing 10 days of intravenous micafungin and achieving sustained clinical stability, therapy was transitioned to oral fluconazole at a dose of 400 mg daily based on susceptibility data and treatment response.

Monitoring and follow-up

Regular monitoring of hepatic and renal function was performed throughout hospitalization to assess for potential drug toxicity. Transthoracic echocardiography was conducted to exclude fungal endocarditis and revealed no abnormalities.

Following completion of combined antifungal therapy, the patient was discharged in stable condition with arrangements for outpatient follow-up. At subsequent review, he remained asymptomatic, with no evidence of recurrent infection.

Discussion

Invasive candidiasis remains a significant cause of morbidity and mortality among hospitalized patients, particularly those with multiple risk factors. Early recognition and prompt initiation of appropriate antifungal therapy are essential for improving survival and preventing complications.

Several factors contributed to the development of candidemia in this patient, including diabetes mellitus, chronic kidney disease, recent gastrointestinal intervention, and prolonged exposure to broad-spectrum antibiotics. These conditions likely disrupted normal host defenses and facilitated fungal bloodstream invasion.

Current clinical guidelines recommend echinocandins as first-line therapy for candidemia, especially in critically ill patients and those with renal impairment. Echinocandins exhibit excellent activity against most Candida species while minimizing nephrotoxicity compared with alternative agents such as amphotericin B. In this case, micafungin provided effective initial treatment and was well tolerated.

Antifungal susceptibility testing played a crucial role in guiding treatment decisions. The emergence of antifungal resistance among Candida species, particularly reduced susceptibility to fluconazole, has become an increasing concern worldwide. Susceptibility-guided therapy allows clinicians to optimize treatment outcomes while supporting antifungal stewardship initiatives.

Source control measures, including removal of indwelling vascular catheters, are equally important in managing candidemia. Failure to eliminate potential reservoirs of infection has been associated with persistent fungemia, treatment failure, and increased mortality.

Close monitoring of renal and hepatic function is essential during antifungal therapy, particularly in patients with pre-existing organ dysfunction. Regular laboratory surveillance enables early detection of adverse drug reactions and facilitates timely treatment modifications when necessary.

This case illustrates the importance of individualized treatment strategies that integrate patient-specific risk factors, microbiological findings, susceptibility patterns, and careful monitoring to achieve successful outcomes.

Conclusion

Invasive candidiasis remains a serious and potentially life-threatening infection, particularly among patients with diabetes mellitus, chronic kidney disease, and recent healthcare exposure. Early diagnosis, prompt initiation of appropriate antifungal therapy, and effective source control are critical determinants of successful treatment.

Echinocandins represent an effective first-line therapeutic option in patients with candidemia and renal impairment, while step-down therapy with fluconazole may be considered once clinical stability and microbiological clearance are achieved. This case underscores the importance of antifungal stewardship, individualized patient care, and vigilant monitoring in optimizing outcomes for invasive fungal infections.

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