Acta Scientific Gastrointestinal Disorders (ISSN: 2582-1091)

Volume 9 Issue 3 March 2026

Case Report

Invasive Fungal Infection (IFI) by *Trichosporon* Species Resembling Renal Mass on CT Scan: A Case Report

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Received: March 24, 2026

Published: June 22, 2026

Abstract

Invasive fungal infections (IFIs) are life-threatening systemic infections that require prompt diagnosis and treatment because they are associated with high morbidity and mortality. Approximately 1.9 million patients develop an acute invasive fungal infection each year. In addition, the global emergence of multidrug-resistant fungal species has further worsened treatment outcomes and increased mortality rates. Several fungal species demonstrate resistance to all four major classes of antifungal drugs, including polyenes, azoles, echinocandins, and the pyrimidine analogue (e.g., 5-flucytosine). Because of the limited number of antifungal agents that can be used systemically, the management of IFIs remains clinically challenging.

IFI can be caused by a variety of pathogens, among which *Trichosporon* species are considered a rare cause. These pathogenic yeasts are widely distributed in nature and are also present as part of the normal flora of human skin, the gastrointestinal (GI) tract, and the respiratory tract. Disseminated disease caused by these organisms can involve multiple organs and may present as soft tissue lesions, lymphadenopathy, or abscesses that can mimic malignancy.

Here, we report a histopathologically confirmed case of invasive fungal infection caused by the rare fungal pathogen *Trichosporon* in a 23-year-old male who presented with shortness of breath and weight loss. Imaging findings on CT scan initially suggested renal cell carcinoma (RCC). The patient also had a recent history of prolonged high-dose antibiotic therapy for pulmonary tuberculosis (TB).

Keywords: Invasive Fungal Infection; CT Scan; Pulmonary Tuberculosis

Introduction

Trichosporon is an opportunistic pathogenic fungus that is rarely encountered in routine clinical practice but can cause severe and potentially fatal infections in immunocompromised individuals [1]. The exact mode of transmission of this organism is not clearly understood. *Trichosporon* species are widely distributed in nature and are commonly isolated from soil and other environmental sources. They are also known to colonize human skin as well as the gastrointestinal and respiratory tracts as commensal organisms [2].

Infection with *Trichosporon* can disseminate to multiple organs, including the kidneys, liver, spleen, lungs, and gastrointestinal tract, often leading to severe disease and death [3]. On imaging studies, particularly CT scans, the infection may appear as low-attenuation lesions in the liver, spleen, or kidneys. These radiological findings can mimic metastases, lymphoma, pyogenic abscesses, or tuberculosis [4].

Disseminated trichosporonosis may therefore present as malignant-appearing lesions on CT imaging, leading to potential misdiagnosis. Furthermore, invasive trichosporonosis remains difficult to diagnose and treat [5]. Accurate and timely diagnosis is essential for selecting appropriate antifungal therapy and improving clinical outcomes [6].

We report an unusual case of invasive fungal infection caused by *Trichosporon*, which was initially misdiagnosed as a renal mass due to its imaging characteristics, including arterial phase enhancement and washout on venous and delayed phases of a triphasic CT scan in a patient with a history of treated pulmonary tuberculosis nine months earlier.

Case Presentation

A 23-year-old male with a history of hepatitis B infection presented to the pulmonary outpatient department with complaints of chronic cough for three years, chest pain for the past 3.5 months, and shortness of breath for one month. These symptoms were associated with a history of undocumented weight loss. The patient had a prior history of pulmonary tuberculosis, which was treated for nine months in 2017. Recent bronchoalveolar lavage (BAL) for the detection of acid-fast bacilli (AFB) and sputum AFB smear were both negative. The patient subsequently underwent a triphasic CT scan with intravenous contrast. The findings on the CT scan showed a hypodense endophytic poorly enhancing mass measuring 6.2 × 4.3 × 5.2 cm identified arising from the mid-lower pole of the right kidney. Another large hypodense lesion with ill-defined margins measuring 9.7 × 6.7 × 5.3 cm was noted in the left lobe of the liver. Multiple additional patchy hypodense areas were detected in the right lobe of the liver. A hypodense soft tissue density lesion was also seen in the common bile duct (CBD). Multiple para-aortic lymph nodes were present. An extensive enhancing mediastinal mass measuring 6.7 × 4.0 × 3.0 cm was seen extending into the left lower lobe of the lung. A few enlarged mediastinal lymph nodes were also observed. Core needle biopsy samples from the kidney, lung, and liver masses were obtained under ultrasound guidance. Microscopic examination of the biopsy specimens demonstrated large areas of acute necrotizing inflammation with foreign body giant cells containing numerous thick-walled yeast forms. Special staining with Periodic Acid–Schiff with diastase (PAS-D) highlighted fungal elements suggestive of an invasive fungal infection.

The patient was referred to the Infectious Diseases Department for further management and was admitted in internal medicine unit and started on intravenous Amphotericin-B 40 mg once daily for 14 days.

Further fungal staining using lactophenol cotton blue stain demonstrated thick-walled yeast cells exhibiting yeast and hyphal forms with pseudohyphae, suggestive of *Trichosporon* species. Identification was confirmed using the API (Analytical Profile Index) method.

He was then switched to oral Voriconazole 200 mg twice daily for six months, as it is considered more effective against *Trichosporon* species. He was discharged on 20 April 2021 and advised to follow up after six months.

However, the patient was lost to follow-up and returned after eight months in January 2022, having completed six months of antifungal therapy. A follow-up contrast-enhanced CT scan of the chest, abdomen, and pelvis performed on 28 January 2022 showed a significant reduction in the size of the lesions compared with the previous scan, suggesting improvement in the disease process. The antifungal regimen was then changed to Itraconazole 200 mg once daily, and the patient was advised to return for follow-up after three months.

The patient was again lost to follow-up and presented after one year in January 2023. A repeat CT scan demonstrated stable disease.

Discussion

These are emerging opportunistic pathogens that are responsible for deadly invasive disease, of which Trichosporonosis is the most common one which is noted in immunocompromised individuals and seen less in immunocompetent individuals [5].

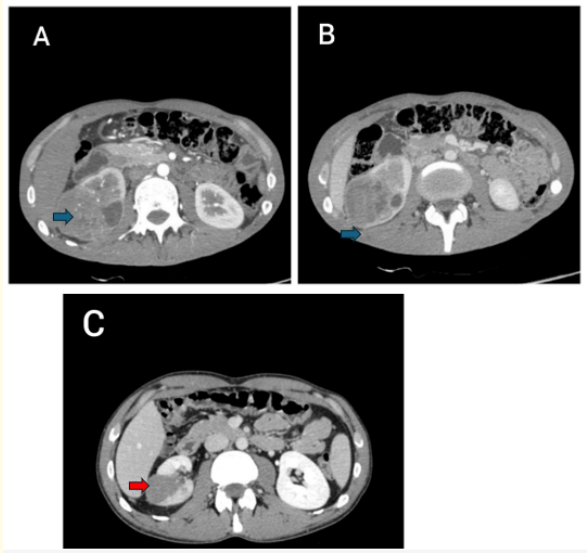

Figure 1: Contrast enhanced computed tomography of abdomen showing right renal mass. (A) Arterial phase showing internal vascularity and (B) Venous phase showing washout (blue arrows). (C) Contrast enhanced computed tomography of abdomen showing Post treatment decrease in size of lesion of right kidney (red arrow).

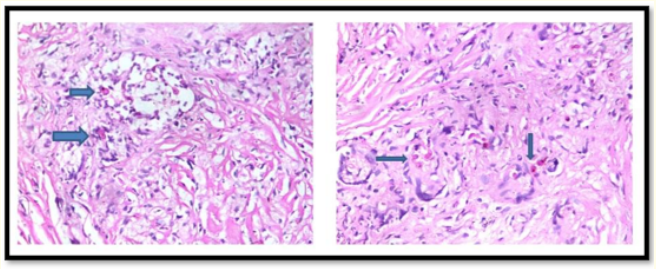

Figure 2: Renal tissue showing numerous multinucleated giant cells along with chronic inflammatory cells infiltrate. Giant cells contain PAS positive thick walled yeasts of fungus (blue arrows). (PAS stain; x 400).

Invasive infection due to *Trichosporon* is rare. Invasion of the pathogen occurs exogenously or endogenously [14]. *Trichosporon* species are the second most common yeast species responsible for causing disseminated infection involving many organs of human body [5]. Patients with past surgical history or those on antibiotics are more likely to get fungal infection by *Trichosporon* species. Besides haematological malignancies and neutropenia, individuals taking high doses of corticosteroids are also considered at high risk of getting infection by *Trichosporon* species [7].

The clinical symptoms and radiological findings in patients suffering from *Trichosporon* infection differ according to the organs involved [13]. In cases of central nervous system infection, the predominant symptoms are headache, nausea, vomiting, and fever. A patient with dyspnea suggest that pulmonary involvement is present and can include a productive cough and even bloody sputum. Diffuse infiltrates are seen in the chest x-ray with an alveolar pattern. Patients that have disseminated trichosporonosis with the involvement of the kidneys may have proteinuria, microscopic haematuria, and renal failure [5]. Invasive *Trichosporon* infection appears on CT Scan Chest Abdomen Pelvis with contrast as low attenuation areas in involved organs [12,13]. Infections caused by rare pathogens are subjected to misdiagnosis resulting in poor treatment and unsatisfactory outcomes [7].

Involvement of kidneys is common in disseminated infection [11]. Disseminated Trichosporonosis affect many organs and appear as soft tissue lesions, lymphadenopathy or abcesses appearing as malignancy [14].

In biopsy samples *Trichosporon* species are seen as combination of hyphae and arthroconidia [11]. The biochemical characters and cell morphology helps in diagnosing *Trichosporon* species. Cultures of biopsy samples and blood samples are gold standard for identifying the etiology of fungal pathogens [5,14,15]. Histopathology and microscopy using stains also aids in diagnosing rare species [7]. On culture media they grow in form of yeast like colonies of cream to yellowish grey colour [14].

Trichosporon are dimorphic fungi exhibiting 2 morphologies; a uni-cellular yeast and a multi-cellular hyphal form. Invasion of fungi occurs through hyphal form. The hyphal cells invades the epithelial lining of organs causing opportunistic infection [8]. *Trichosporon* species have several virulence factors including morphologic transition from yeast to hyphal cells, formation of biofilms, lytic enzyme induction and dynamic cell wall. Production of a capsular polysaccharide, Glucoronoxylomannan (GXM) protects the hyphal cells from phagocytosis and also provides ability to fight against intracellular oxidation. Trichosporonosis has become a common cause of fungemia with a mortality rate of 64-100% [9]. UTI is the

most common clinical presentation of trichosporonosis followed by intake of broad spectrum antibiotic therapy [10].

Amphotericin B and fluconazole are common antifungal drugs used for treating trichosporonosis. Echinocandins are found ineffective in treatment of *Trichosporon* infections [7]. Accurate and timely diagnosis of *Trichosporon* is essential for choosing appropriate antifungal therapy for treatment. The effectiveness of limited antifungal drugs against *Trichosporon* species made its treatment difficult [15]. However, Voriconazole is now diagnosed as most active antifungal drug in treating *Trichosporon* infection [5,10,13]. Itraconazole and fluconazole are used as second line drugs. Recurrent *Trichosporon* infection can affect the central nervous system [5].

Conclusion

This case study is presented to highlight that Trichosporonosis is a rare often fatal fungal infection with high rates of mortality and morbidity. It is difficult to diagnose as it mimics with malignancy due to its radiological features. Due to the emergence of cause by these deadly pathogens, these must be included in the differential diagnosis in cases with disseminated disease. Diagnosis of these pathogens is best done by biopsy and blood cultures thus these must be considered at first for accurate and timely diagnosis of these pathogens.

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