DISSEMINATED TRICHOSPORONOSIS INVOLVING LOBAR NEPHRONIA, MUSCULAR ABSCESSES AND CUTANEOUS PAPULES IN A PATIENT WITH ACUTE LYMPHOBLASTIC LEUKEMIA: A CASE REPORT

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Abstract

Trichosporon asahii has emerged as a severe life-threatening, opportunistic, systemic pathogen along with high mortality rates because of the increased use of cytotoxic or immunosuppressive drugs. We report a case of catheter-related *T. asahii* bloodstream infection complicated with multiple septic skin lesions in the extremities, lobar nephronia, and a muscular abscess in the neutropenic period after receiving chemotherapy. We successfully treated *T. asahii* infection using voriconazole for ten weeks without complications.

Keywords: *Trichosporon asahii*, Lobar nephronia, muscular abscess, fungemia, voriconazole

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Introduction

Trichosporon asahii is characterized as a urease-positive, nonencapsulated basidiomycetous yeast and has emerged as an important life-threatening, opportunistic pathogen with reduced susceptibility to antifungal therapy among immunocompromised patients.[1] Invasive trichosporonosis with urinary tract infection is an unusual invasive infection described mainly among hospitalized patients. *T. asahii,* the most common pathogen, remains a diagnostic and therapeutic dilemma for which no clear indications are available.[2]

Here, we report a rare case of invasive *T. asahii* bloodstream infection with multiple metastatic foci, including multiple septic skin lesions in the extremities, lobar nephronia and muscular abscess in one patient with acute lymphoblastic leukemia after receiving induction chemotherapy.

Case report

In January 2023, a 20-year-old man was admitted for induction chemotherapy with cyclophosphamide, vincristine, doxorubicin and dexamethasone. Three months prior, he was diagnosed with acute lymphoblastic leukemia. His vital signs were stable on admission, and his physical examinations were unremarkable. On day 11 after chemotherapy, the patient experienced fever without chill and multiple-sized, well-defined erythematous to purpuric macules and papules with pustules at the face, trunk, palms, arms, and legs **(Figure 1)**. Physical examinations revealed a body temperature of 38.7°C, blood pressure of 110/70 mm Hg, and pulse rate of 108/min. His blood cell count indicated profound neutropenia with an absolute neutrophil count of 0×10^9/L. His chest radiograph, blood chemistry tests, and urinalysis noted no abnormal results. Blood culture from a peripherally inserted central catheter and peripheral vein was performed, and meropenem and vancomycin were administered as empirical antibiotics.

On day 12 after chemotherapy, 24 hours after entering the automated blood culture system, blood culture from the peripherally inserted central catheter was reported to be positive, and the gram stain finding revealed a yeast-like organism **(Figure 2A).** White to cream-colored colonies, >15 colony-forming units with raised surfaces on sheep blood agar plates, were isolated **(Figure 2B).** The peripherally inserted central venous catheter was removed, a catheter tip culture was performed, and amphotericin B deoxycholate 1 mg/kg was administered. The fever persisted on day 15 after chemotherapy, and the blood culture reported yeast, not C. albicans. We used matrix-assisted laser desorption-ionization time-of-flight mass spectrometry (MALDI-TOF MS) to identify the yeast. Gram stain and methylene blue colonies revealed budding yeast with pseudohyphae and arthroconidia **(Figures 2C and 2D).** Intravenous voriconazole at the dose of 6 mg/kg IV twice daily for loading and then 4 mg/kg IV twice daily for maintenance was administered owing to suspected *Trichosporon* infection.

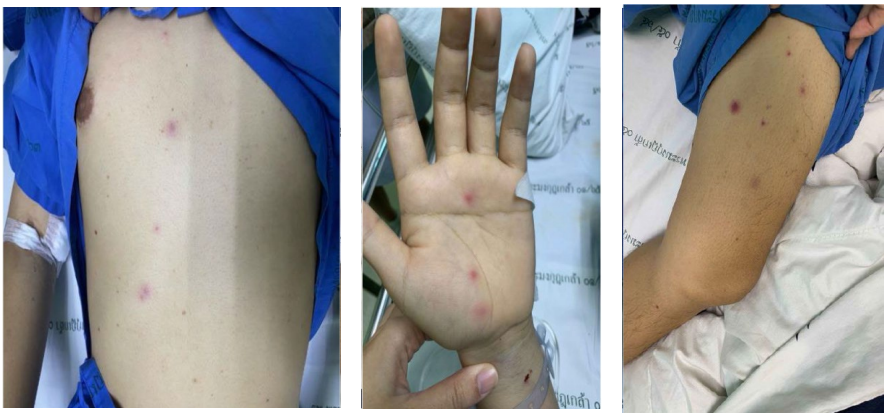

Figure 1. Multiple various sizes of well-defined erythematous to purpuric macules and papules with pustules at the face, trunk, palms, both arms, and legs

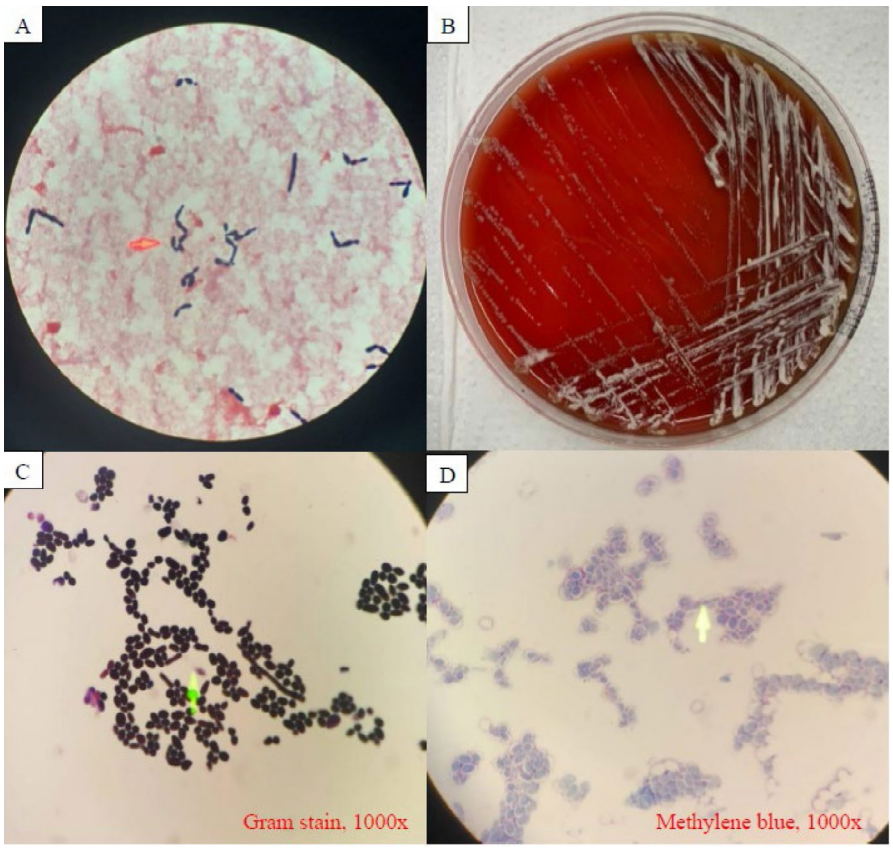

Figure 2 A. Blood Gram stain finding reveals a yeast-like organism, **B.** White to cream-colored colonies >15 CFU on sheep blood agar plates, **C&D**. Colonies Gram stain and methylene blue found budding yeast with pseudohyphae and arthroconidia

On day 17, after chemotherapy, the fever and skin lesions improved. Blood culture from the peripherally inserted central venous catheter and catheter tip culture yielded *Trichosporon asahii* (MALDI-TOF MS; score 2.30)[3,4] but nothing from the peripheral line. We also performed 18s rRNA gene PCR from isolated fungal colonies and identified them as *T. asahii* (GenBank accession no. ALBS01000009.1). Blood culture was repeated from two peripheral venous sites, resulting in no persistent fungemia. The results of the galactomannan and cryptococcal antigen tests were both negative. We discontinued meropenem, vancomycin, and amphotericin B but continued intravenous voriconazole until 14 days. However, drug susceptibility for *T. asahii* was not tested. On day 25 after chemotherapy (Day 10 of voriconazole therapy), his neutrophil count recovered, having an absolute neutrophil count of 1.25×10^9/L, but he still presented persistent fever. Hence, computed tomography of the whole abdomen was performed, indicating focal parenchymal enhancement at the lower pole of the left kidney without perinephric fat stranding, probably lobar nephronia, and a newly seen small, rim-enhancing hypodense lesion at the right quadratus lumborum muscle probably an abscess. We concluded these findings were disseminated trichosporonosis and continued oral voriconazole after intravenous voriconazole for 14 days. The voriconazole dosing regimen was adjusted using therapeutic drug monitoring until radiographic resolution of the lobar nephronia and the rim-enhancing hypodense lesion at the right quadratus lumborum muscle after 10-week voriconazole treatment.

Discussion

Trichosporon species are distributed in external environments such as soil, wood and air, and they represent one part of the normal human skin flora (especially in the perigenital area),

respiratory tract, and gastrointestinal tract.[5] All pathogenic members of the genus *Trichosporon* have undergone several reclassifications, and more recently, 50 species have been described, of which 16 have been associated with human infections.[5]

In most cases, *T. asahii* (74%) has emerged as an important, life-threatening, opportunistic systemic pathogen primarily attributed to increased utilization of cytotoxic or immunosuppressant agents. The clinical manifestations of *Trichosporon* infection represent various ranges, from localized form to disseminated in multiple organs, particularly among immunocompromised patients.[2] The infection most commonly presented as fungemia (75%), and approximately 50% of cases were associated with metastatic skin lesions such as papular-purpuric, nodular, vesicular, or pustular lesions.[2]

In our case report, disseminated trichosporonosis metastasized to the kidney and deep-seated muscle, forming an intramuscular abscess. According to one related study, a patient with acute myelogenous leukemia presented with disseminated trichosporonosis and multiple splenic abscesses[6]. Trichosporonosis mimics candidiasis in clinical presentation and exhibits hematogenous dissemination to the kidneys and muscles, causing myositis and, consequently, abscess. The diagnosis of invasive *Trichosporon* infection was based on microscopy in wet mount or tissue biopsy specimen and culture.[5] The microscopic morphology of *T. asahii* showed septate hyphae, pseudohyphae and blastoconidia with cylinder-shaped arthroconidia.[5] Colonies on solid media are white with raised farinose surfaces. *Trichosporon* species share antigens with *Cryptococcus* and *Aspergillus*. Many related reports demonstrated a cross-reaction for cryptococcal and galactomannan antigens.[7] Therefore, dual positivity in these tests may be interpreted as an indicator of invasive trichosporonosis, but the sensitivity and specificity of these tests had not been defined.[6] Recently, molecular tests were developed, including polymerase chain reaction-based methods, flow cytometry assays, and proteomics.[5] Definite treatment guidelines for invasive *T. asahii* infections have yet to be established. In previous cases, *Trichosporon* species were resistant to flucytosine or echinocandins and showed various susceptibilities *in vitro* and limited activity to amphotericin B *in vivo*.[8] However, a recent study suggested that azoles were superior to other antifungal drug classes in prophylaxis and treatment for *Trichosporon* infections using low minimum inhibitory concentrations (MICs).[9] Based on a head-to-head comparison of five triazoles, voriconazole demonstrated the best therapeutic effect in both *in vitro* and *in vivo* activities; it showed promising results for treating disseminated *T. asahii* infection.[10] We used voriconazole because one related study reported that the MICs of voriconazole were between 0.03 and 1.0 μg/mL and used to successfully treat disseminated *T. asahii* infection. [11]

Conclusion

T. asahii can cause deep-seated abscesses secondary to fungemia involving multiple organs, and it should be investigated, especially among patients with neutropenia and an unfavorable clinical response after appropriate treatment. Early diagnosis and treatment of *T. asahii* infection are crucial among high-risk patients, even those receiving antifungal agents; this can lead to selecting the most appropriate therapeutic approach and improving prognosis.

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Author's Contributions

All authors met the ICMJE authorship criteria and participated in the patient's diagnosis, management, and/or care. M.D. was responsible for patient care and wrote the draft. W.N. revised and supervised the manuscript's writing. All authors read and approved the final manuscript.

Conflict of interests

The authors declare that they have no conflict of interest.

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