



A DIAGNOSTIC DILEMMA: CRYPTOCOCCAL MENINGITIS IN A CHRONIC ALCOHOLIC WITH NO KNOWN IMMUNODEFICIENCY

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ABSTRACT

Cryptococcal meningitis typically occurs in immunocompromised individuals but can rarely affect immunocompetent hosts. We present a case of a 45-year-old male with a history of chronic alcohol use, who presented to the emergency department during an episode of alcohol withdrawal with complaints of fever and altered sensorium. Clinical evaluation revealed signs suggestive of meningitis, and cerebrospinal fluid analysis demonstrated elevated protein and decreased glucose levels. Microbiological studies identified *Cryptococcus neoformans* as the causative organism. He was treated with amphotericin B and flucytosine with clinical improvement. This case highlights the importance of considering cryptococcal meningitis even in apparently immunocompetent patients with subtle risk factors.

KEYWORDS : Cryptococcal meningitis, immunocompetent, *Cryptococcus neoformans*, fungal meningitis

INTRODUCTION

Cryptococcus neoformans is a ubiquitous encapsulated yeast that causes life-threatening meningoencephalitis, predominantly in immunocompromised individuals such as those with HIV/AIDS, organ transplants, or malignancies.¹ However, rare cases have been reported in immunocompetent hosts, often associated with subtle risk factors such as chronic alcoholism, environmental exposure to bird droppings, or undiagnosed immune dysregulation. These cases may present atypically, leading to delayed or missed diagnosis. In such scenarios, meticulous history taking becomes crucial, as it can uncover hidden risk factors and guide clinicians toward an accurate diagnosis and a tailored treatment plan.² However immunocompetent individuals with cryptococcal meningitis have better clinical outcomes after treatment if diagnosed early.³

We here report a rare case of cryptococcal meningitis in an apparently immunocompetent individual with a history of chronic alcohol use and recent alcohol withdrawal presenting with confusing symptoms of meningitis. This emphasizes the importance of high clinical suspicion, proper history taking and comprehensive diagnostic evaluation.

Case Presentation

History: A 45-year-old male, mason by occupation, originally from Uttar Pradesh, presented to the emergency department of our tertiary care hospital with high-grade fever (103°F) for seven days, altered sensorium for three days, and features of alcohol withdrawal including tremors, agitation, and insomnia. The patient had a long-standing history of heavy alcohol consumption but no known comorbidities such as diabetes, HIV, or tuberculosis. There was no history of steroid use or other immunosuppressive therapy. History revealed rearing of pigeons in his neighborhood in Uttar Pradesh where he visited a month back and stayed for 28 days. No underlying immunodeficiency was identified.

Physical Examination: The patient was febrile, disoriented,

and exhibited signs of meningeal irritation, including neck stiffness and positive Kernig's sign. Neurological examination revealed a Glasgow Coma Scale (GCS) score of 11/15.

Fundus examination was unremarkable. No focal neurological deficits were noted.

Laboratory Investigations :

Routine Laboratory Investigations: The routine investigations showed hemoglobin of 13.1 g/dL, total leukocyte count of 8900 cells/mm³, and mildly elevated serum creatinine (1.6 mg/dL).

Liver function tests were within normal limits. HIV and HBsAg tests were non-reactive.

Biochemical Investigation: Cerebrospinal fluid (CSF) was clear on gross examination. CSF glucose was 44 mg/dL which is low and protein level was elevated at 180.17 mg/dL. Adenosine deaminase level in CSF was 8.4 U/L which is in normal range.

Cytological Analysis: Cytological analysis revealed 280 white blood cells/μL with 4% neutrophils and 96% lymphocytes.

Microbiological Examination: Illustrated In Figure 1

Wet mount examination of the CSF revealed 1–2 yeast cells with a clear surrounding halo and 2–3 polymorphonuclear cells per high-power field HPF. Gram staining showed 1–2 budding yeast cells along with 2–4 PMNs per oil immersion field.

India ink preparation demonstrated 2–3 encapsulated yeast cells with occasional budding. Bacterial cultures remained sterile, while CSF cultured on Sabouraud Dextrose Agar yielded colonies consistent with *Cryptococcus neoformans*. Cartridge-Based Nucleic Acid Amplification Test for *Mycobacterium tuberculosis* was negative.

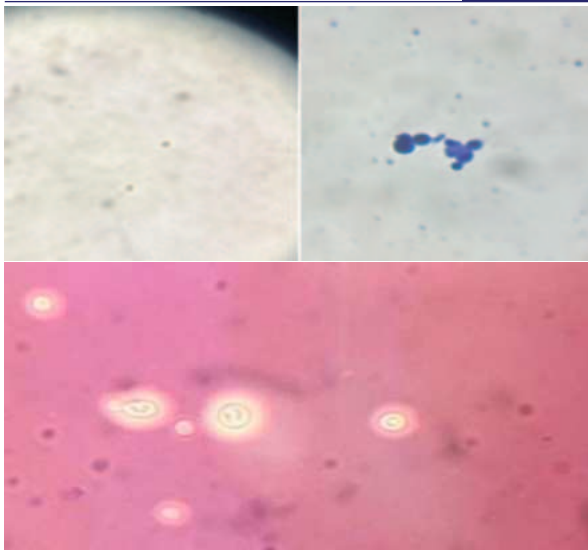


Figure 1: Wet mount, Gram staining and India ink

The patient was initially started on empirical antibacterial therapy but was shifted to antifungal treatment with amphotericin B and flucytosine after microbiological confirmation. He was monitored for renal function and electrolyte imbalance during antifungal therapy. Gradual clinical improvement was observed over two weeks, with resolution of fever and improvement in sensorium.

DISCUSSION

Cryptococcal meningitis remains a diagnostic challenge in immunocompetent individuals due to its atypical clinical course and low index of suspicion. While most cases occur in immunocompromised hosts, studies have shown that *C. neoformans* can cause invasive disease in apparently healthy individuals, especially when exposed to environmental sources such as bird droppings, notably pigeons as was noted in our patient's residential settings.⁴

Alcohol As An Immunomodulator

Alcoholism, while not classically categorized as an immunocompromised state, is known to impair both innate and adaptive immunity. Chronic alcohol use can lead to dysfunction of neutrophils, macrophages, and T-cell mediated immunity, predisposing individuals to opportunistic infections.⁵

Diagnostic Challenges

The overlap of alcohol withdrawal symptoms (e.g., agitation, confusion) with features of meningitis posed a diagnostic challenge. This underlines the importance of maintaining a broad differential diagnosis and including fungal infections in the workup of altered mental status, even in patients without HIV.

India ink remains a rapid screening tool in resource-limited settings.⁶ However, culture remains the gold standard, and cryptococcal antigen detection in CSF or serum (CrAg) is highly sensitive and should be performed when available.⁷ In this case, the classic triad of CSF findings high protein, low glucose, and lymphocytic pleocytosis was suggestive of fungal meningitis and prompted appropriate investigations.

Management And Prognosis

Timely initiation of antifungal therapy is critical. The standard induction therapy includes amphotericin B with flucytosine, followed by consolidation and maintenance with fluconazole. Monitoring for complications such as raised intracranial pressure and drug toxicity is essential throughout the

treatment.⁸

CONCLUSION

Cryptococcal meningitis should be considered in the differential diagnosis of meningoencephalitis even in immunocompetent individuals.⁹ This is particularly important particularly when environmental exposures or subtle immunological risk factors such as alcoholism are present. This case highlights the importance of detailed clinical history, high diagnostic suspicion, and prompt mycological investigations. Early recognition and antifungal therapy can significantly improve patient outcomes.

REFERENCES

1. Park BJ, Wannemuehler KA, Marston BJ, Govender N, Pappas PG, Chiller TM. Estimation of the current global burden of cryptococcal meningitis among persons living with HIV/AIDS. *AIDS*. 2009 Feb 20;23(4):525–30.
2. Brizendine KD, Baddley JW, Pappas PG. Predictors of Mortality and Differences in Clinical Features among Patients with Cryptococcosis According to Immune Status. Feldmesser M, editor. *PLoS ONE*. 2013 Mar 26;8(3):e60431.
3. Acharya S, Yadav SK, Singh PB, Bhandari S, Gautam J, Pathak S, et al. Cryptococcal meningitis in an immunocompetent individual: A case report. *Clin Case Rep*. 2021 Oct;9(10):e04894.
4. Lin X, Heitman J. The Biology of the *Cryptococcus neoformans* Species Complex. *Annu Rev Microbiol*. 2006 Oct 1;60(1):69–105.
5. Meadows GG, Zhang H. Effects of Alcohol on Tumor Growth, Metastasis, Immune Response, and Host Survival. *Alcohol Res Curr Rev*. 2015;37(2): 31–22.
6. Siagian FE. Paint It Black: Staining of the Yeast *Cryptococcus Neoformans* with India Ink. *Int J Pathog Res*. 2024 May 16;13(3):56–64.
7. Zhao Y, Ye L, Zhao F, Zhang L, Lu Z, Chu T, et al. *Cryptococcus neoformans*, a global threat to human health. *Infect Dis Poverty*. 2023 Mar 17;12(1):20.
8. Williamson PR, Jarvis JN, Panackal AA, Fisher MC, Molloy SF, Loyse A, et al. Cryptococcal meningitis: epidemiology, immunology, diagnosis and therapy. *Nat Rev Neurol*. 2017 Jan;13(1):13–24.
9. Jha A, Adhikari S, Sigdel KR, Paudyal B, Basnyat B, Kayastha G, et al. Case Report: Cryptococcal meningitis in an apparently immunocompetent patient in Nepal - challenges in diagnosis and treatment. *Wellcome Open Res*. 2019 Jun 17;4:55.