Multifocal Brain Abscesses in a Near-Drowning Patient Caused by *Candida*: A Rare Complication

S. M. Tahmid Khan[1], Lutfun Nahar Nizhu[2], Ahmad Mursel Anam[3], Syeda Nayma Noor[4]

[1.] RMO, Acute Medicine & HDU, Square Hospitals Ltd.
[2.] Specialist, Acute Medicine & HDU, Square Hospitals Ltd.
[3.] Associate Consultant, Acute Medicine & Critical Care, Square Hospitals Ltd.
[4.] RMO, Acute Medicine & HDU, Square Hospitals Ltd.

Case Report

Received: July 03, 2024
Revised: September 09, 2024
Accepted: November 15, 2024

*Corresponding Author:

Dr. S. M. Tahmid Khan
Resident Medical Officer
Acute Medicine & HDU,
Square Hospitals Ltd.
E-mail: tahmid2012@gmail.com

ABSTRACT:

Candida brain abscesses are rare, particularly in immunocompetent individuals. We present a case of a young male who developed multiple brain abscesses following a near-drowning incident, emphasizing the significance of antifungal treatment and providing a comprehensive review of relevant literatures for comparative analysis.

Key words: *Candida albicans*, Brain abscess, Near-drowning, Central nervous system infection, Fungal meningitis, Aspiration pneumonia.

INTRODUCTION:

Central nervous system (CNS) infections with fungus are not common. They typically affect immune-compromised patients and those with invasive medical devices, or with genetic immune disorders. Brain abscesses caused by Candida species are rare.[1] *Candida albicans* is the most common species, while other species are seldom identified in CNS infections.

CASE REPORT:

A 20-year-old man with no significant medical history was involved in a high-speed motor vehicle accident in June 2024. He was thrown out of his vehicle and fell into a pond, where he was submerged underwater for approximately ten minutes before being rescued. He developed multiple lacerations on his right lower limb and aspirated water and mud. After initial resuscitation at the Emergency department, he was conscious but later lapsed into a comatose state with a Glasgow Coma Scale (GCS) score of 6 out of 15 (E2V2M2). He was found to have aspiration pneumonia on chest radiography, but no evidence of fracture on X-rays of his limbs, pelvis, and chest. A computed tomography (CT) scan of the brain showed no signs of bleeding or fracture. After 2 days of admission, he was intubated and put on mechanical ventilation (MV) due to his low GCS and severe respiratory distress and shifted to the ICU of a tertiary care hospital. The patient developed septic shock and inotropes were needed for maintaining blood pressure. The tracheal aspirate cultures and blood cultures grew carbapenem-resistant *Klebsiella pneumoniae* and *Acinetobacter* and the urine culture showed candida albicans.

Based on the culture and sensitivity results, targeted antibiotic and antifungal therapy were initiated, along with other supportive management measures including regular wound care. Septic shock was improved. GCS improved to 15/15 (E4V5M6) and oxygen demand decreased, successfully extubated and maintained adequate oxygen saturation (SPO_2) on room air. Wound dressing was managed under the supervision of a plastic surgeon and was kept open for secondary wound closure.

He was transferred to the Acute Medicine and High Dependency Unit (HDU) after 6 days of treatment in the ICU. However, after one day of the transfer, he again developed altered level of consciousness. The following day, the patient developed new episodes of fever. Upon examination, neck rigidity was present. The patient also showed signs of raised intracranial pressure (ICP). His pupils were unequal in size, he had a positive Babinski sign bilaterally, and right-sided hemiplegia was also found. MRI of the brain revealed multiple ring-enhancing lesions consistent with multifocal brain abscesses in various parts of the

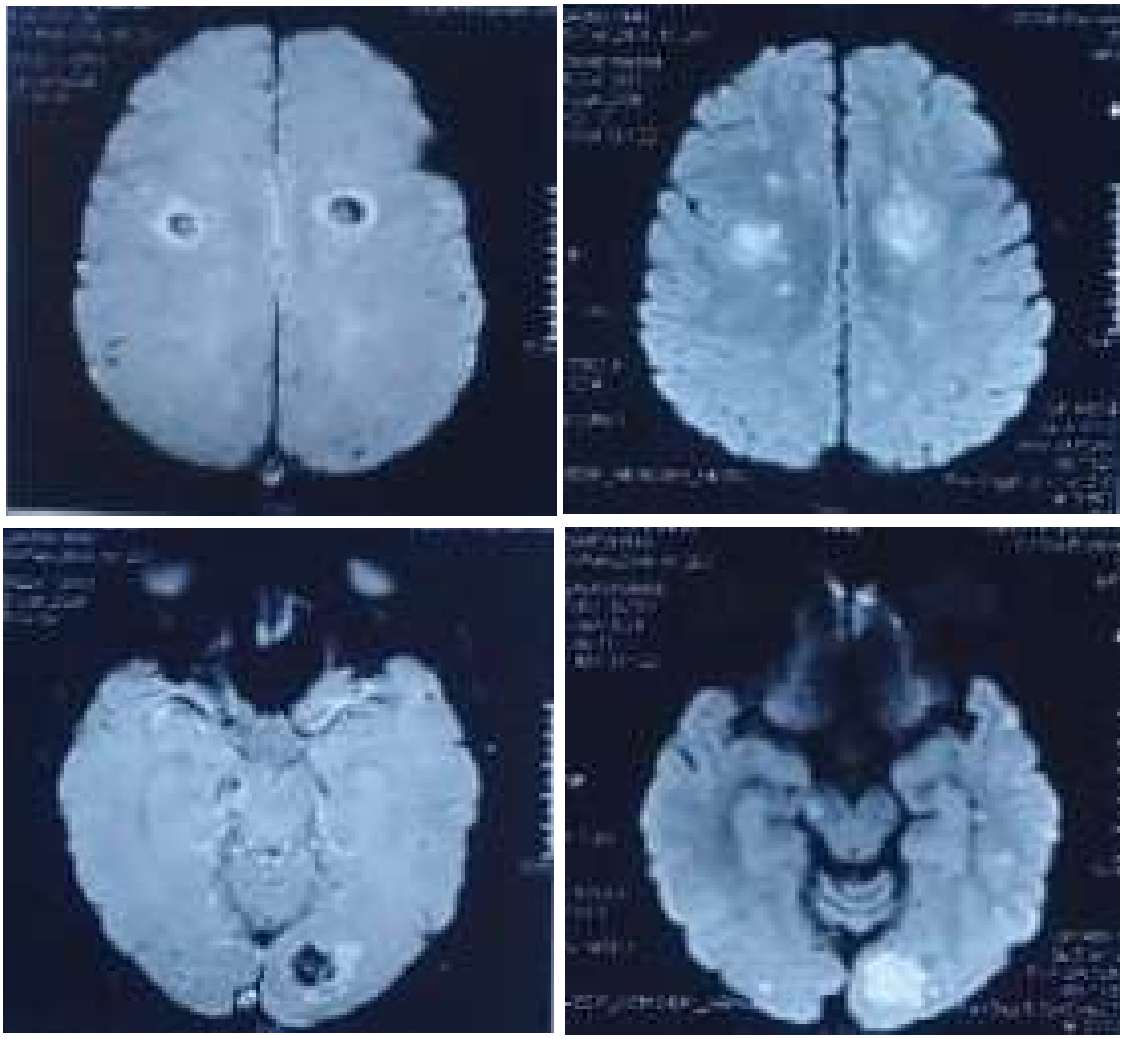

Fig-1: Multiple ring-enhancing lesions consistent with multifocal brain abscesses in both cerebrum (largest one at left occipital lobe), thalamus, basal ganglia and brainstem, and cerebellum and significant mass effect.

brain and a significant mass effect. The duration between the accident and the development of symptoms of the brain abscess was 10 days. The patient was treated with hypertonic saline and dexamethasone, and his head was kept elevated at 30 degrees to reduce raised ICP. However, the next day, the patient experienced multiple seizures and severe respiratory distress, requiring reintubation and transfer back to the ICU after receiving anticonvulsant medication. A neurosurgery consultation was planned for a possible emergency aspiration or surgical excision of the brain abscess, along with a culture and histopathological study for targeted antibiotic therapy. Lumbar puncture for CSF study was carried out. CSF RT-PCR report showed *Candida albicans*. Anti-fungal treatment was started. However, due to the patient's poor prognosis, low Glasgow Coma Scale (GCS) score, and hemodynamic instability, the patient's parents decided to discharge him against medical advice, given the limited prospects for recovery.

DISCUSSION:

Candida infections of the central nervous system (CNS) are rare. It may present as meningitis or intracranial abscesses.[2,3] These abscesses typically consist of multiple microabscesses and are linked with widespread infection in individuals with compromised immune systems.[4]

Patients who develop CNS infections are often immunocompromised. Patients who are admitted to the intensive care unit having a central venous line, getting total parenteral nutrition and broad-spectrum antibiotics are at the highest risk of developing candidemia.[4,5] Candida meningitis most commonly occurs after neurosurgical procedures such as craniotomy or through a ventricular shunt.[6-10] Candida CNS infections are typically caused by *C. albicans*,[4] although they can also occur with other species such as *C. parapsilosis* and *C. tropicalis. C. glabrata* is a rare cause of CNS infection.[8]

CNS fungal infections may present with various clinical syndromes, including basal meningitis, space-occupying lesions, stroke syndromes, hydrocephalus and spinal infections. Compared to viral, bacterial or parasitic CNS disorders, symptomatic CNS fungal infection carries higher risks of morbidities and mortality.[9]

The possible presence of CNS Candida infection should be suspected in patients with neurologic symptoms who have one or more of the following

- Isolation of Candida from the cerebrospinal fluid (CSF).
- Isolation of Candida from another normally sterile site in patients with pleocytosis on CSF analysis. Finding Candida species in blood cultures is helpful.
- Lack of adequate response of presumed bacterial or mycobacterial meningitis to appropriate therapy.

Performing a lumbar puncture to collect cerebrospinal fluid (CSF) for culture and analysis is crucial for diagnosing. The culture positivity rate is about 80 percent.[4] In our patient, the CSF study showed cell count of 202, neutrophil 92%, lymphocyte 8% and Protein 98(12-60) mg/dL. CSF RT-PCR showed growth of *Candida albicans*. Magnetic resonance imaging (MRI) can identify microabscesses, which appear as multiple, small, ring-enhanced lesions. Sometimes these lesions may also have a hemorrhagic component.[11] Our patient had multiple abscesses in the cerebrum and cerebellum with hemorrhagic components on the MRI brain.

The usual first-line treatment for Candida meningitis is a combination of amphotericin B and flucytosine. Liposomal amphotericin B is preferred because it seems to produce higher concentrations in the brain compared to conventional amphotericin B deoxycholate. Voriconazole can also be effective against most Candida species except C. krusei or C. glabrata are often resistant to voriconazole, so it is used as a step-down therapy. Caspofungin and other echinocandins do not reach sufficient concentrations in the cerebrospinal fluid to effectively treat Candida meningitis.[11] Echinocandins are not recommended for central nervous system candidiasis. Antifungal therapy should continue until all abscesses have resolved on magnetic resonance imaging (MRI). Additionally, the cerebrospinal fluid (CSF) glucose levels, pleocytosis, protein levels, and culture should return to normal, and the patient's symptoms and signs should resolve.[12,13] It may take weeks to months for these measures to be accomplished, especially for patients with chronic Candida meningitis.

CONCLUSION:

Multifocal brain abscesses with mass effect following near-drowning are a rare complication. The presence of multi-drug-resistant systemic infection makes management more complex. This case emphasizes the importance of suspecting this neurological event like brain abscess when a patient with open wounds comes in following a high-speed motor vehicle accident, and when a near-drowning patient develops aspiration pneumonia. Prompt diagnostic imaging and a coordinated, multidisciplinary approach to management are crucial. Despite best efforts, outcomes may remain poor, highlighting the need for continued research into more effective therapeutic strategies. Advances in neuroimaging, antimicrobial therapies, and prompt neurosurgical intervention in emergencies are essential for improving the prognosis of such patients. Further studies on the pathophysiology and optimal management strategies for multifocal brain abscesses in the context of polytrauma and near-drowning are necessary.

REFERENCES:

1. Kourbeti IS, Mylonakis E. Fungal central nervous system infections: prevalence and diagnosis. Expert Rev Anti Infect Ther 2014;12:265–73, doi:http:// dx.doi. org/ 10.1586/ 14787210.2014.874282.
2. Mattiuzzi G, Giles FJ. Management of intracranial fungal infections in patients with haematological malignancies. Br J Haematol 2005; 131:287.
3. Fennelly AM, Slenker AK, Murphy LC, et al. Candida cerebral abscesses: a case report and review of the literature. Med Mycol 2013; 51:779.
4. Sánchez-Portocarrero J, Pérez-Cecilia E, Corral O, et al. The central nervous system and infection by Candida species. Diagn Microbiol Infect Dis 2000; 37:169.
5. Nguyen MH, Yu VL. Meningitis caused by Candida species: an emerging problem in neurosurgical patients. Clin Infect Dis 1995; 21:323.
6. Sánchez-Portocarrero J, Martín-Rabadán P, Saldaña CJ, Pérez-Cecilia E. Candida cerebrospinal fluid shunt infection. Report of two new cases and review of the literature. Diagn Microbiol Infect Dis 1994; 20:33.
7. Cruciani M, Di Perri G, Molesini M, et al. Use of fluconazole in the treatment of Candida albicans hydrocephalus shunt infection. Eur J Clin Microbiol Infect Dis 1992; 11:957.
8. Voice RA, Bradley SF, Sangeorzan JA, Kauffman CA. Chronic candidal meningitis: an uncommon manifestation of candidiasis. Clin Infect Dis 1994; 19:60.
9. Raman Sharma R: Fungal infections of the nervous system: Current perspective and controversies in management. Int J Surg 8: 591-601, 2010.
10. O'Brien D, Stevens NT, Lim CH, et al. Candida infection of the central nervous system following neurosurgery: a 12-year review. Acta Neurochir (Wien) 2011; 153:1347.
11. Lai PH, Lin SM, Pan HB, Yang CF. Disseminated miliary cerebral candidiasis. AJNR Am J Neuroradiol 1997; 18:1303.
12. Pappas PG, Kauffman CA, Andes DR, et al. Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America. Clin Infect Dis 2016; 62:e1.
13. Deresinski SC, Stevens DA. Caspofungin. Clin Infect Dis 2003; 36:1445.