CASE REPORT

# Fungal Cerebritis Mimicking as Cerebral Infarction: A Diagnostic Dilemma

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## Abstract

Fungal infections affecting the central nervous system are uncommon in the general population and typically arise as a secondary condition from a primary site of infection. These infections are predominantly observed in immunocompromised individuals, such as those with acquired immunodeficiency syndrome or those who have undergone organ transplantation. The absence of a significant inflammatory response often leads to nonspecific neuroradiological findings, which can be confused with conditions like tuberculous meningitis, pyogenic abscesses, or brain tumours and infarctions. The identification of intracranial fungal infections has increased, attributed to the rising number of AIDS cases, advancements in radiological imaging and improved microbiological detection methods, While various fungi can lead to encephalitis, cryptococcal meningoencephalitis is the most commonly encountered followed by infections Caused by aspergillus and candida species. Although radiographic findings alone may lack specificity, correlating the clinical context with computed tomography or magnetic resonance imaging can aid in reaching an accurate diagnosis. We are discussing a case of a 47-year-old male who presented in the ER with left-sided weakness. He was diagnosed with a right Middle Cerebral Artery infarct case. He underwent a Decompressive Craniotomy in which pus flakes were found on Interhemispheric tissue. Pus was sent for a culture and Sensitivity test which showed fungal hyphae on smear.

**Keywords:** *Fungal infection, cerebral infarction, meningitis, encephalitis, neuroradiology, cerebritis.*

## INTRODUCTION

Fungal infections of the central nervous system have become significantly more common over the past decades [1]. Infections with fungi cause significant morbidity in immunocompromised hosts, and the involvement of the central nervous system may lead to fatal consequences these individuals are more susceptible to invasive fungal infections under certain circumstances, such as, near drowning, post–neurosurgical procedures, and severe trauma [2, 3]. Overall, central nervous system infection is still an uncommon manifestation of fungal dissemination [4, 5]. Clinical signs and symptoms may be nonspecific, laboratory cultures are often negative, and neuroimaging features can be non-specific as well fungal central nervous system lesions are frequently mistaken on neuroimaging as tumours, pyogenic abscesses, meningitis and tuberculosis [6, 7]. The radiographic appearance alone is usually not specific, but the combination of the appropriate clinical setting along with computed tomography or magnetic resonance may help to suggest the correct diagnosis [8, 9].

## CASE REPORT

A 47-year-old Male, a known case of diabetes mellitus and hypertension came to the ER with complaints of an Altered level of consciousness and decreased responsiveness. He had a history of falls 3 days back for which he was taken to the emergency department there he regained consciousness and complained of left-sided weakness along with deviation of the angle of mouth. MRI and MRA brain was performed which concluded a large area of subacute ischemic infarction with petechial hemorrhage seen in the territory of the right Middle cerebral Artery (**Fig. 1A&1B**), causing midline shift of 1.3 cm and mild dilatation of left lateral ventricle with periventricular cerebrospinal fluid seepage (**Fig. 2(A-C)**). MRA showed minimal to mild segmental narrowing in both posterior cerebral and basilar arteries. The right vertebral artery appeared hypoplastic with non-visualization of its V4 segment representing its occlusion. Anterior circulation appeared normal with elevation of the Right Middle Cerebral artery (**Fig. 3A&3B**). Diagnosis of Right Middle Cerebral Artery infarct was made. The patient underwent a Right Decompressive Craniotomy and VP shunt. Operative findings showed pus flakes on Interhemispheric tissue and empyema in brain tissue. A tissue sample was sent for culture and sensitivity which revealed Moderate Pus Cells and Fungal Hyphae however species of fungus were not identified. The patient again presented with a complaint of pus discharge from the wound. His post-surgical MRI and MRA brain were performed which concluded: Right frontoparietal craniotomy (**Fig. 4A&4B**). Significant swelling and inhomogeneous enhancement of soft tissues of the scalp in the right parietal temporal region (Status post-surgery). Previously seen edematous brain parenchyma shows heterogeneous signal intensity and gliotic changes with mild herniation through the bony defect (**Fig. 4A&4B**). Signal intensity of hemosiderin and a few air specks were also seen in this region likely post-surgical. The post-contrast study showed a lack of enhancement representing necrotic non-viable

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*Received: October 28, 2024; Revised: December 31, 2024; Accepted: March 19, 2025*
*DOI: https://doi.org/10.37184/jlnh.2959-1805.3.19*

  

brain parenchyma (**Fig. 5A&5B**). Previously seen mass effects on the right lateral ventricle and midline shift were resolved completely. Mild to moderate dilatation of lateral and third ventricles was seen compared to the previous MRI. No definitive restricted diffusion was noted to suggest abscess formation (**Fig. 6A&6B**). A few small foci of high signal intensity were seen in left frontoparietal regions representing small ischemic infarctions. MRA was normal (**Fig. 7A&7B**). A post-surgical CT scan was done which concluded previous surgery with cranioplasty on the right side with underlying post-surgical changes. A Shunt Catheter was seen on the left side with its tip in the Lateral Ventricle. The ventricles were moderately dilated (**Fig. 8A&8B**). During the hospital course, the patient was given a high dose of antifungal ketoconazole with fluid replacement as supportive care. After a week the patient was discharged as he was vitally stable but had left-sided weakness and was advised for follow-up in the infectious department and neurosurgery OPD.

## Pre-Surgical MRI

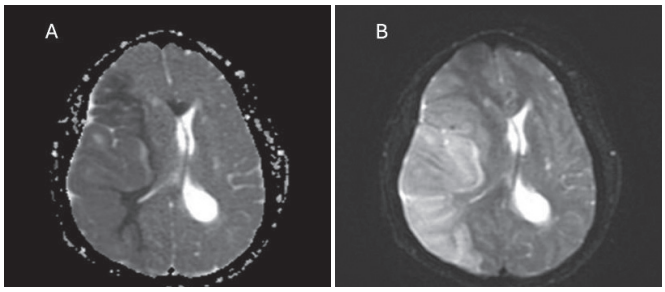


**Fig. (1A and B)**: DWI and ADC images show a large area of restricted diffusion in the territory of the right MCA.

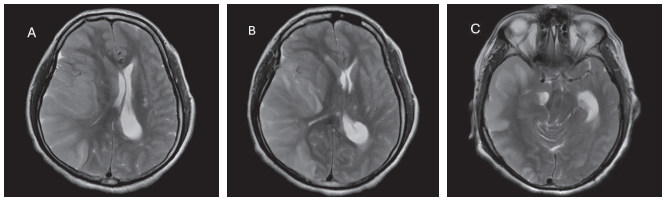


**Fig. (2A-C)**: Abnormal T2 high signals are seen involving the right side territory of the Right MCA.


**Fig. (3A and B)**: MRA MRA showed minimal to mild segmental narrowing in both posterior cerebral and basilar arteries. The right vertebral artery appeared hypoplastic with non-visualization of its V4 segment representing its occlusion. Anterior circulation appears normal with an elevation of Right.

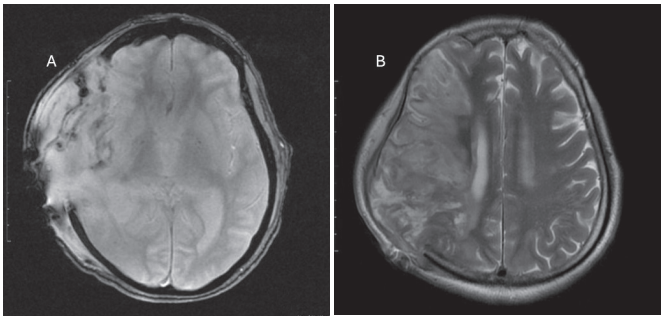


**Fig. (4A and B)**: T2 and DRE show right Frontoparietal craniotomy, the heterogenous signal intensity with gliotic changes and blooming artefacts.

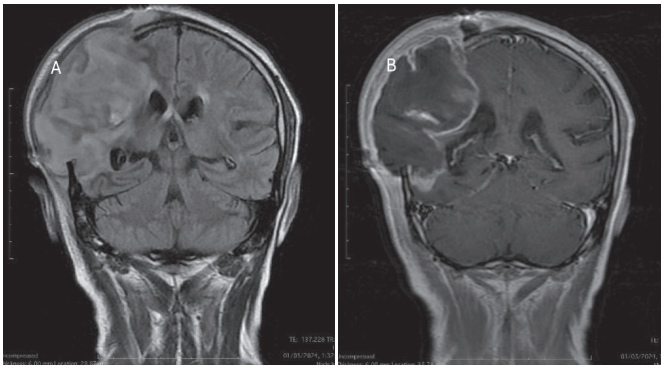


**Fig. (5A and B)**: FLAIR and PC Images show brain herniation through bony defect and lack of enhancement with chronic necrotic non-viable parenchyma.

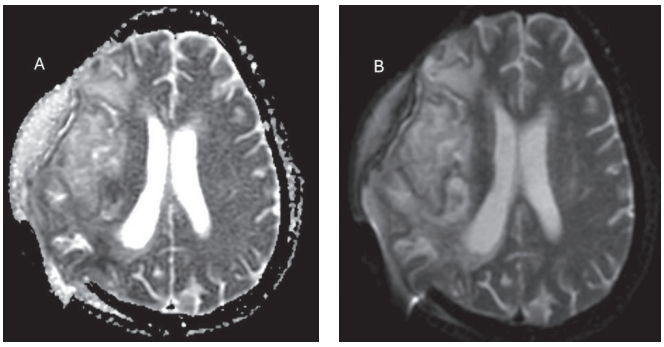


**Fig. (6A and B)**: On DWI and ADC shows no definite restricted diffusion.

## Post-Surgical MRI

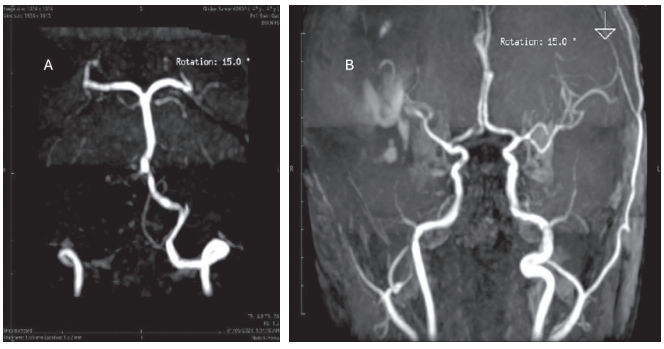


**Fig. (7A and B)**: MRA appears normal with a hypoplastic right vertebral artery.

**Post-Surgical CT**

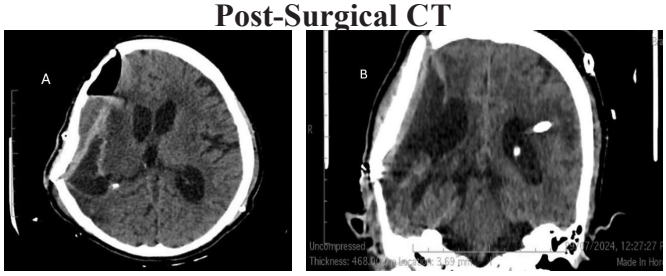


**Fig. (8A and B)**: Shows cranioplasty on the right side with post-surgical changes and dilated ventricles with a shunt catheter.

## DISCUSSION

Fungal infections of the central nervous system (CNS) present significant challenges for healthcare providers, often showing non-specific symptoms like headaches, fever, and changes in mental status [1, 3, 7]. Cryptococcal meningoencephalitis (CM) causes cerebral infarction, typically, lacunar infarction in the basal ganglia [6]. These ambiguous signs can easily mislead clinicians, leading to delays in diagnosis and treatment. The rising incidence of opportunistic fungal infections, especially among immunocompromised individuals, has made this issue even more complex likely secondary to a rise in the number of procedures for transplant, the increasing use of immunosuppressive drugs, and increasing cases of human immunodeficiency virus. A history of steroid use, chemotherapy, illicit IV drug use, broad-spectrum antibiotics, and indwelling venous catheters are also considered risk factors for fungal infections [9]. Fungal Central Nervous System lesions are often mistaken on neuroimaging as tumours, pyogenic abscesses, or meningitis, such as tuberculosis [5]. Advanced imaging techniques, particularly magnetic resonance imaging (MRI) play a vital role in the diagnostic process. MRI is excellent for providing detailed anatomical views and can identify lesions that require further examination. However, it is crucial to be aware of its limitations; differentiating between benign and malignant lesions can be quite difficult, and the imaging features of fungal infections may closely resemble those of tumours or other conditions [2]. This risk of misdiagnosis highlights the importance of correlating MRI results with clinical history and other diagnostic methods, such as lumbar puncture for cerebrospinal fluid analysis [3, 7]. In recent years, an immune assay testing the cryptococcal antigen in serum and CSF has been approved by the US Food and Drug Administration [3]. The increase in CNS fungal infections can be linked to various factors affecting immunocompromised patients [4]. Those undergoing chemotherapy are particularly at risk due to the significant immunosuppression that comes with cancer treatment [5]. Likewise, organ transplant recipients, who need long-term immunosuppressive therapy to avoid organ rejection, are more vulnerable to infections from fungi like candida and Aspergillus [6]. The high doses of antibiotics can disrupt the normal microbial flora, creating conditions that favour opportunistic fungal infections [7]. In addition, individuals suffering from sepsis often experience immune dysregulation, which further heightens their susceptibility [8]. This trend is especially evident in patients with HIV/AIDS, who face a significantly increased risk of opportunistic infections, including cryptococcal meningitis [3]. The interplay of these factors underscores the need for heightened awareness and vigilance [8]. Good management is centred around surgery for big or compressive mass lesions and early, effective antifungal medication. Although supplementation with growth factors or additional recombinant cytokines has proven effective in some hosts whose infections are refractory, alternate strategies must include high-dose pulse corticosteroids followed by taper [2].

## CONCLUSION

We report an unusual case of fungal infection that resembled a cerebral infarction, emphasizing the diagnostic difficulties and the necessity for thorough diagnostic evaluations. The patient's first symptoms pointed towards an ischemic stroke; however, further tests uncovered a fungal cause. This case highlights the importance of healthcare providers to include fungal infections in differential diagnosis when faced with cerebral infarction-like symptoms, especially in patients with weakened immune systems. A delayed diagnosis can result in serious outcomes, including higher rates of morbidity and mortality**.**

## CONSENT FOR PUBLICATION

Written informed consent was taken from the patient.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

## ACKNOWLEDGEMENTS

Declared none.

## AUTHORS' CONTRIBUTION

BS: Conception or design, AU, BS, UP, BR: Acquisition, analysis, or interpretation of data, AU, UP: Drafting the work or revising, BS: Final approval of the manuscript.

## GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this work the author(s) limitedly used ChatGPT (GPT-4, OpenAI) to get language suggestions and do minor proofreading in some parts of the manuscript. After using this tool/

service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

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