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UNVEILING CEREBRAL ASPERGILLOMA - DIAGNOSTIC INSIGHTS OF FUNGAL STAINING IN A YOUNG IMMUNOCOMPETENT MALE WITH A MASQUERADING SPACE-OCCUPYING LESION

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ABSTRACT Aspergillosis, caused by Aspergillus fumigatus, often spreads to the central nervous system (CNS) from primary infections in the eyes, sinuses, or middle ear. CNS aspergillosis is typically associated with immunocompromised states, such as alcoholic liver disease or Cushing syndrome. However, invasive aspergillosis has also been reported in immunocompetent individuals. This case highlights a young, immunocompetent male who presented with headache and left-sided weakness. Radiological imaging revealed a space-occupying lesion with a midline shift, initially suspected to be a glioma. Following a rapid decline in consciousness, an emergency craniotomy was performed. Histopathological analysis confirmed cerebral aspergillosis. Despite timely intervention, the patient succumbed. This case emphasizes the need to consider fungal infections like aspergillosis in the differential diagnosis of CNS lesions, even in immunocompetent patients, as it can mimic conditions such as gliomas and pose significant diagnostic challenges.

KEYWORDS : Aspergilloma, C.N.S - Central nervous system, Grocott Gomori methenamine silver stain (GMS), Periodic acid Schiff stain (PAS), immunocompetent.

INTRODUCTION

Intracranial fungal infections are almost always an intriguing finding. The presentation is usually subtle and can be misdiagnosed clinically and radiologically as neoplastic lesions. They can even be missed in immunocompetent patients. Early recognition and prompt management are crucial in improving outcomes for patients with cerebral aspergillosis[4].

Case Report

A male patient in his 40s presented to the hospital with a history of left-side hemiparesis and headache for 3 days. There was no history of any comorbidities. He also had a past history of a Road Traffic Accident 3 years back that resulted in an injury to his left thigh; however, there was no reported associated head trauma.

On examination, he appeared agitated and was oriented and alert. He had multiple ulcers over the left thigh and gluteal region and underwent secondary suturing for the same. These ulcers were healing in nature with minimal slough and adequate granulation tissue. The remaining examination of other systems was within normal limits.

The initial investigations included a complete blood count, comprehensive metabolic panel, viral markers, and ECG. The CT Brain revealed a large parenchymal hypodense attenuation lesion in the right fronto-temporoparietal lobes with adjacent white matter edema and midline shift to the left. Subsequent MRI Brain Plain and contrast indicated a sizable ill-defined area of T1 hypo / T2 hetero-intense lesion showing diffusion restriction, suggesting the presence of a Glioma (Fig 1)

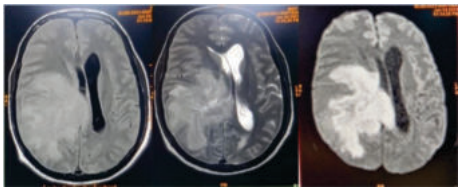

Fig 1 – MRI - T1, T2 and DWI Image Shows the Space Occupying Lesion

Based on the radiological evidence, a provisional diagnosis of Glioma was established. However, the patient's condition rapidly deteriorated the following day, with the development of anisocoria and a sudden decline in consciousness level. Consequently, emergency right decompressive craniotomy with excision of the lesion and removal of the bone flap was performed. The excised sample was sent for Histopathological examination, gram stain, AFB stain, and culture. Unfortunately, on postoperative day 1, the patient experienced hypotension necessitating ionotropic support and subsequently suffered cardiovascular arrest from which he could not be revived. The histopathology report revealed findings indicative of Cerebral aspergilloma with angioinvasion.

Intra-operative Findings: Emergency craniotomy and excision of the lesion were done. Bulging of brain parenchyma noted. (Fig 2)

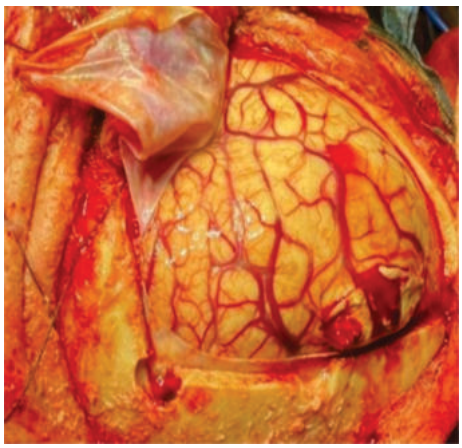

Fig 2 - Intraoperative Image Shows the Space Occupying Lesion

Pathological Findings

1. **Gross Specimen:** Multiple pale white irregular tissue bits were received altogether, measuring 1x1cm.
2. **Microscopy:** On haematoxylin and eosin stained sections revealed areas of normal brain parenchyma along with areas of necrosis and many foreign body type of giant cells (Fig 3), upon which differential diagnosis of Tubercular infection or fungal etiology was made. On staining with PAS stain (Fig 4) and GMS stain (Fig 5), Aspergillus fungal hyphae were seen and Ziehl Neelsen stain – Negative.

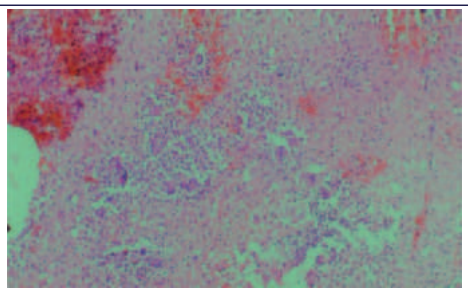

Fig 3 - H & E Stain Shows Areas of Patchy Necrosis, Chronic Inflammatory Cells and Many Foreign Body Giant Cells

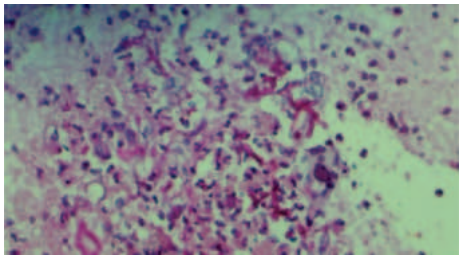

Fig 4 - Periodic Acid Schiff Stain Shows Septate and Acute Angle Branching Hyphae Suggestive of Aspergillosis

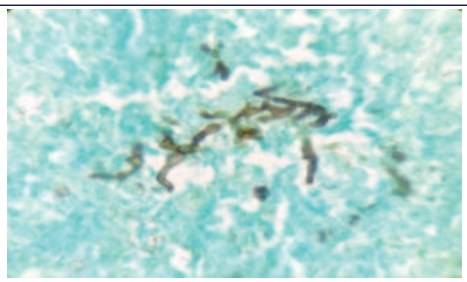

Fig 5 - GMS Stain Highlights Aspergillus Hyphae

DISCUSSION

Aspergillus fumigatus typically enters the body through the inhalation of spores. Cerebral infection can arise from hematogenous dissemination from the lungs or direct extension from the paranasal sinuses and orbits [5]. The characteristic neuroimaging finding of CNS aspergillosis, described as a mass with thick irregular walls in immunocompetent patients, is less commonly observed in immunocompromised individuals, posing challenges to diagnosis [5]. Aspergillus species appear stout in GMS stain and frequently branch at acute angles. Unlike other infectious organisms, the pathophysiology of Aspergillus involves angio-invasion, leading to rapid cerebral infarctions. Table 1 shows a comparison of case reports in which cerebral aspergillosis presents as a space-occupying lesion in immunocompetent patients.

Table 1 - Case Studies Documented in the Literature, Where Cerebral Aspergillosis Mimicking as a Space-occupying Lesion in Patients Who are Immunocompetent.

Case report	Clinical details	Radiological findings	Pathological findings	Initial Management
Singh M et al (1)	28/male with severe headache and vomiting. CNS examination revealed bilateral papilledema and decreased visual acuity. Working diagnosis of invasive pituitary adenoma vs. chordoma vs. sarcoma	MRI showed a large mass measuring 4.5 x 5.1 x 3.1 cm invading the sphenoid sinus, ethmoid sinus, sella, and clivus.	Histopathology revealed Granulomatous inflammation along with few septate, branched fungal hyphae morphologically suggestive of Aspergillus species.	VP shunt with subtotal endoscopic decompression of the tumor.
Durairaj A et al (2)	42/male with headache, drooping of the right eyelid, and facial numbness for 8 months. Neurological examination revealed bilateral Grade 1 papilledema with ptosis and Visual acuity was 6/9 in both eyes.	MRI showed a right cavernous sinus and orbit apex lesion. CSF - Gram stain and culture, anti brucella antibodies, Indian ink, cryptococcal capsular antigen, and acid-fast bacilli were negative. Aspergillus antigen and serology were negative.	Histopathological examination with Gomori Methanamine stain of the sample was suggestive of dichotomous, acute-angled branching septate hyphae of fungi, morphologically consistent with Aspergillus.	Surgical biopsy of the lesion was done
Almeida LC et al (3)	64/male with bradyphrenia and apraxia. History of SARSCoV-2 for 2 months.	MRI showed multiple lesions in both cerebral hemispheres suggesting brain abscesses	On post-op day 5 – Reported as fungal infection with Aspergillus fumigatus	Stereotaxic biopsy was performed with the aspiration of purulent content, and on post-op day 7, the patient's condition worsened and declared brain death.
Present case	40 / male, with left sided hemiparesis and headache for 3 days.	CT Brain revealed a large parenchymal hypodense lesion in the right fronto-temporoparietal lobes with adjacent white matter edema and midline shift to the left.	Histopathological examination with GMS and PAS stains revealed acute angled stout hyphae with branching, morphologically consistent with Aspergillus	Emergency craniotomy was done

The above-mentioned case reports reveal not only the importance of histopathology but also the use of special stains, though the clinical presentation and radiological evidence supported a different diagnosis. To make a definitive diagnosis the need of the hour is to rely on histopathological study.

CONCLUSION

It is important to keep Aspergillus infection as a differential diagnosis when no tumour tissue is seen in cases presenting as intracranial space-occupying lesions. Radiologically, these lesions mimic glioma; hence, histopathological study and special stains play a major role in diagnosing definitively. Increased awareness among healthcare professionals regarding the potential for atypical presentations of cerebral aspergillosis, especially in immunocompetent patients, is essential for timely diagnosis and appropriate management as it is angioinvasive.

Conflict of Interest - None

REFERENCES

1. Singh M, Zaita B M, Singh D, et al. (February 01, 2023) Sphenoid Sinus Aspergilloma in an Immunocompetent and an Immuno-compromised Patient: A Case Report. Cureus 15(2): e34517.
2. Durairaj A, Madhu G. A Rare Case of Aspergillus Granuloma in the Cavernous Sinus of an Immunocompetent Patient. APIK Journal of Internal Medicine. 2023 Apr 13.
3. Almeida LC, Braga HM, Costa BS. Cerebral Aspergillosis in an Immunocompetent Patient after COVID-19 Infection. Arquivos Brasileiros de Neurocirurgia: Brazilian Neurosurgery. 2022 Jul 7.
4. El Hasbani G, Chirayil J, Nithisoontorn S, Antezana AA, El Husseini I, Landaeta M, Saeed Y, Assaker R. Cerebral aspergillosis presenting as a space-occupying lesion in an immunocompetent individual. Medical mycology case reports. 2019 Sep 1;25:45-8.
5. Rosai J. Rosai and Ackerman's surgical pathology e-book. Elsevier Health Sciences; 2011 Jun 20.
6. Verma R, Singh P, Kumar A, Paliwal VK. Cranial aspergilloma masquerading as meningioma. Case Reports. 2013 Jan 9;2013:bcr2012008118.
7. Memória Jr JR, Rufino EP, do Rêgo Aquino PL, Guimarães Filho FV, Neto TM, de Vasconcelos HK. Brain aspergilloma in an immunocompetent individual: A case report. Surgical Neurology International. 2020;11.
8. Lange N, Wantia N, Jörger AK, Wagner A, Liesche F, Meyer B, Gempt J. Fungal brain infection—no longer a death sentence. Neurosurgical Review. 2020 Oct 9:1-6.
9. Kumar D, Nepal P, Singh S, Ramanathan S, Khanna M, Sheoran R, Bansal SK, Patil S. C.N.S. aspergilloma mimicking tumors: review of C.N.S. aspergillus infection imaging characteristics in the immunocompetent population. Journal of Neuroradiology. 2018 May 1;45(3):169-76.
10. Shamim MS, Siddiqui AA, Enam SA, Shah AA, Jooma R, Anwar S. Craniocerebral aspergillosis in immunocompetent hosts: surgical perspective. Neurology India. 2007 Jul 1;55(3):274.