

Fungal Cerebellar Abscess in an Immunocompetent Patient

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ABSTRACT

Objective: We aimed to describe a case of fungal cerebellar abscesses due to *Aspergillus* in an immunocompetent patient.

Methods: This was a case report of a patient who presented at King Abdulaziz University Hospital for management of fungal cerebellar abscess.

Results: A 27-year-old Saudi patient presented with signs of cerebellar dysfunction, reduced visual acuity outcome, and hoarseness following medical therapy and neurosurgery for cerebellar aspergillosis. Brain computed tomography and magnetic resonance imaging scans revealed findings that were suggestive of a recurrent or residual abscess. Treatment was initiated with oral corticosteroids and liposomal amphotericin B. Two weeks later, liposomal amphotericin B was substituted for oral voriconazole. An initially planned surgical excision was deferred following the improvement of the patient's symptoms.

Conclusion: Fungal cerebellar abscesses due to *Aspergillus* are extremely rare, especially in immunocompetent patients. A high index of suspicion coupled with aggressive neurosurgical intervention and medical treatment can lead to a favorable outcome in patients with cerebellar abscesses due to *Aspergillus*.

Keywords: Fungal, Cerebellar, Abscess, Immunocompetent, Patient.

INTRODUCTION

Intracranial abscesses are uncommon, severe infections that can result in a fatal outcome if diagnosis or treatment is delayed. Globally, the incidence of the intracranial abscess is approximately 0.4–0.9 per 100,000 population, with higher rates documented in immunocompromised patients; however, it can occur in patients of any age, including newborn infants⁽¹⁾. About 70% of patients with intracranial abscesses are male, aged 34 years on average⁽²⁾. The etiologic agent may be any microorganism that can cause infection, including bacteria, fungi, protozoa, or helminths⁽¹⁾.

The focus of infection can arise anywhere but usually from infection of contiguous structures, such as otitis media, mastoiditis, or sinusitis, and spread to the brain through the bloodstream. In some cases, the infection is secondary to cranial trauma or surgery, and, rarely, after meningitis. The source of infection is unidentified in about 15% of patients with brain abscesses⁽³⁾.

Fungal cerebellar abscesses due to *Aspergillus* are extremely rare, with an isolated number of cases reported during the last half decade⁽⁴⁻⁶⁾. In two of the cases, the patients were immunocompetent: one was the case of a middle-aged woman⁽⁴⁾ while the other was the case of a male neonate⁽⁵⁾. The third was a fatal case of *Aspergillus* abscess in an

immunocompromised 12-year-old girl.⁽⁶⁾ We report a case of *Aspergillus* cerebellar abscess in an immunocompetent young male patient.

CASE REPORT

A 27-year-old Saudi male presented to our clinics for the management of a cerebellar abscess due to *Aspergillus* that was treated surgically and medically at another hospital. The patient had a five-month history of hypertension for which no medical treatment was warranted. His history was also remarkable for the following:

- Tinnitus of a few months' duration, which was later followed by a headache. He received treatment for approximately one month, but his condition deteriorated with new-onset gait unsteadiness.
- Brain computed tomography (CT) scan showed a cerebellar mass, and the patient was started on steroid treatment, which was administered for one month.
- Brain magnetic resonance imaging (MRI) also confirmed the cerebellar mass in addition to a chest mass.
- A biopsy specimen was obtained from the mass, and a tissue culture revealed *Aspergillus fumigatus* growth.

- The patient was treated with intravenous voriconazole, which was administered for two months, followed by oral voriconazole, which the patient had been taking for more than three weeks before visiting our clinics.
- A ventriculoperitoneal shunt was offered, and the patient was discharged on oral voriconazole syrup.
- Nosocomial pneumonia complicated by empyema. Appropriate antibiotherapy was instituted based on antibiogram susceptibility testing.

At presentation, physical examination revealed the presence of cerebellar signs on the left side. The patient also had a poor visual acuity outcome and hoarseness.

A repeat brain MRI was performed, and it showed a ring-enhancing, predominantly left-sided vermian lesion measuring 2.5 X 2.4 X 2.2 cm surrounded by vasogenic edema. Also noted was a shunt tube that had been introduced into the right lateral ventricle through the right posterior parietal lobe. A repeat brain CT scan showed a left occipital subcortical non-enhancing lesion with a small, low-signal-intensity focus on susceptibility-weighted images suggestive of a recurrent or residual abscess.

Laboratory investigations showed the following: hemoglobin 12.8 g/dL (reference range 14.0–18.0), mean cell hemoglobin 25.7 pg (reference range 32–36), mean corpuscular hemoglobin concentration 30.9% (reference range 32–36), white blood cells $6.07 \times 10^3/\mu\text{L}$ (reference range 4.5–11.5), platelets $394 \times 10^3/\mu\text{L}$ (reference range 150–450), automated eosinophils 3.8% (reference range 1.0–3.0), and C-reactive protein 6.91 mg/L (reference range 0.0–3.0). Renal profile and liver function tests revealed the following abnormalities: serum creatinine 118 $\mu\text{mol/L}$ (reference range 53.0–115.0), total serum protein 88 g/L (reference range 64.0–82.0), aspartate amino transferase 8 U/L (reference range 15.0–37.0), and gamma-glutamyl transferase 119 U/L (reference range 5.0–85.0).

A definitive diagnosis of recurrent or residual cerebellar abscess due to *Aspergillus* was made. Surgical excision was offered, and the patient was started on oral corticosteroids and liposomal amphotericin B. Two weeks later, liposomal amphotericin B was substituted for oral voriconazole. However, surgery was deferred following the improvement of the patient's symptoms. There was an increase in his functional capacity to perform basic work activities as shown by his ability to walk with the help of the crutches and good balance

control. Additionally, the patient had a visual acuity of 20/20 and hoarseness improved by 90%.

DISCUSSION

Most patients with intracranial abscesses have a predisposing condition, which may point toward the etiologic agent ^(1,7). Fungal abscesses due to *Aspergillus*, *Candida*, and *Mucorales* species are more common in solid-organ or hematopoietic stem-cell transplant patients or patients who have neutropenia secondary to chemotherapy ⁽¹⁾. In our case, we did not identify possible conditions that predisposed the patient to develop a brain abscess. He was immunocompetent, and his history was unremarkable before the onset of his symptoms.

Aspergillus may enter the intracranial compartment via three routes: hematogenous, contiguous suppurative focus, or as a primary intracranial lesion ^(1,2). The mechanism of extension into the intracranial cavity of our patient is unknown; however, there are two likely causes. First, approximately 70% of brain abscess arise from an otogenic focus ⁽⁸⁾. Our patient reported a history of tinnitus, which is a typical clinical feature in eight percent of patients with otomycosis ⁽⁹⁾. Additionally, given that the patient received treatment that did not result in the resolution of his symptoms, it is possible he developed subacute otitis media, which spreads to the inferior temporal lobe and cerebellum ⁽¹⁰⁾.

Another mechanism that could not be ruled out in our patient is iatrogenic immune system defect related to chronic immunosuppressive therapy. Unfortunately, due to the lack of specific information about the treatments he received before visiting our clinics, it is unknown whether he received high doses of steroids that could potentially depress his immune system or used antibiotics indiscriminately during the early stage of his disease. Previous reports have found increased use of steroids and wide-spectrum antibiotics predisposed patients to developing invasive otomycosis ^(11,12).

Direct extension of *Aspergillus* infection to the brain has been reported following neurosurgery ⁽²⁾. It has been suggested that the stress associated with surgery may also contribute to fungal proliferation ⁽⁴⁾. However, this mechanism was ruled out in our patient, whose surgical history was unremarkable.

Few treatments were explored in our patient. Surgical excision of the abscess was deferred because the patient responded well to liposomal amphotericin B therapy, which is considered to be

the next best alternative to voriconazole, the standard of care for central nervous system aspergillosis⁽¹³⁾. Neurosurgery (excision of *Aspergillus* abscesses, granulomas, and focally infarcted brain), amphotericin B combined with flucytosine, and eradication of the source of infection are the mainstay of management⁽¹⁴⁾. Besides helping in establishing the diagnosis, neurosurgical intervention decreases tumor size or eliminates it, and it is associated with a better prognosis⁽¹⁵⁾.

However, aggressive antifungal systemic therapy appears to play a substantial role in the management of cerebral infections due to *Aspergillus*. Systemic treatments that have been reported to be effective in cerebral aspergillosis include caspofungin, flucytosine, itraconazole, ketoconazole, and several formulations of amphotericin B⁽¹³⁾. Liposomal amphotericin B is safer than conventional amphotericin B in that it can reach higher tissue levels with less toxicity⁽¹³⁾. Nevertheless, some of the limitations of amphotericin B are fungal resistance, low cerebrospinal levels, and severe toxicity associated with its use.

CONCLUSION

Cerebellar abscess due to *Aspergillosis* is a rare finding in immunocompetent individuals. A high index of suspicion coupled with aggressive neurosurgical intervention and medical treatment can lead to a favorable outcome. While newer antifungal agents such as voriconazole may be more efficient than traditional antifungal agents, amphotericin B can serve as a useful alternative in case of treatment failure.

The study was done after approval of ethical board of King Abdulaziz university.

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