

Central nervous system aspergillosis in an immunocompetent patient

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ABSTRACT

أدخلت فتاة تبلغ من العمر 12 عام تعاني من نوبات صدادع لمدة 2 شهر في قسم الطوارئ - مستشفى الزهراء - إيران . أظهر تصوير الكمبيوتر CT والتصوير المغناطيسي MRI ورم في الفص الجبهي الأيمن وكان تأثير الورم واضح . أجريت الجراحة وأظهر الفحص النسيجي داء الرشاشيات . تعرض هذه الدراسة داء الرشاشيات في مضيف مؤهل مناعياً تابع لالتهاب الأذن الوسطى القطري ، على الرغم من ندرة الحالة ، لكن يجب أن تأخذ بعين الاعتبار في المرضى الذين يعانون من التهابات فطرية .

A 12-year-old girl was admitted to the Emergency Department with seizures and headache for 2 months. A CT scan and MRI showed a mass in the right frontal lobe with obvious mass effect. Surgery was carried out, and the resultant pathology was found to be aspergillosis. This study reports aspergillosis in an immunocompetent host following recurrent fungal otitis media. Although this condition is rare, it should be considered in patients with a history of fungal infections.

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Aspergillosis of the CNS is an opportunistic infection that mostly affects immunocompromised patients. It remains life threatening despite therapeutic efforts.¹ The incidence of aspergillosis has increased due to medically indicated immunocompromised host status associated with organ transplantation, cancer treatment, acquired immunodeficiency syndrome (AIDS), diabetes mellitus, and other less frequent lesions.² Fortunately, fungal

infections are rare in populates with normal immunity,³ although there are a few cases introducing cerebral aspergillosis in immune competent hosts. In this report, we present a case of aspergillosis in an immunocompetent host following recurrent fungal otitis media to highlight unique fungal invasion to the intracranial fossa.

Case Report. A 12-year-old girl was admitted to the Emergency Department of Alzahra Hospital, Isfahan, Iran with seizures and headache for 2 months. She was examined and admitted by a resident of neurological disease. The headache was persistent and was felt typically in the right side of the cranium. There were no trigger factors for precipitating headache; also the pain did not respond to analgesics (acetaminophen, ibuprofen, and naproxen). She experienced 3 episodes of focal involuntary movements in the left upper limb, which evolved to secondary generalized tonic clonic seizure each time. Her medical history was significant for right sided hearing loss due to recurrent otitis media 2 years before admission. Her right external auditory canal had been washed several times during this period. She was conscious, alert, and oriented at the first visit. Vital signs (temperature, blood pressure, respiratory rate, and heart rate) were normal. The neurologic exams were normal. She had no signs of meningeal irritation including neck stiffness, Brudzinski's sign, or Kernig's sign. The right external auditory canal had purulent discharge, the tympanic membrane was erythematic, and its markers had disappeared. Examination of other body sites body revealed no problem. All laboratory findings were normal. A CT scan was performed and showed a hyperdense mass in the right frontal lobe with obvious mass effect and midline shift toward the left side and marked vasogenic edema around the mass (Figure 1). An MRI also showed a mass over the right frontotemporal lobe, with low signal intensity in both FLAIR and T2-weighted image series (Figures 2 & 3). The surrounding edema was best observed in the T2 weighted images (Figure 2). She was booked for craniotomy and total mass resection. After craniotomy, when the right front temporal region was exposed, there



Figure 1 - A CT scan of the brain without IV contrast shows a hyperdense mass in the right frontal lobe with obvious mass effect and midline shift towards the left side. A marked vasogenic edema around the mass is visible.

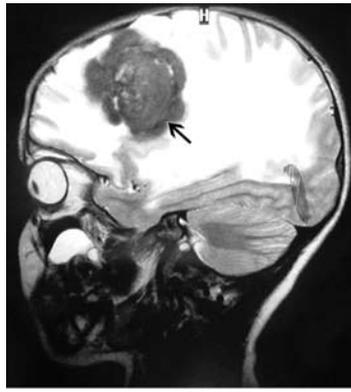


Figure 2 - Sagittal view of the brain MRI in T2-weighted series reveals a large well-defined hypointense mass with lobulated borders in the frontal lobe and massive vasogenic edema.



Figure 3 - Axial view of the brain MRI in FLAIR pulse sequence reveals a large well-defined hypointense lobulated mass in the frontal lobe with surrounding massive vasogenic edema and resultant midline shift.

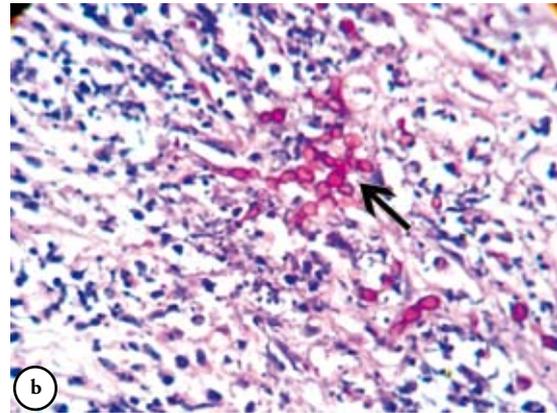
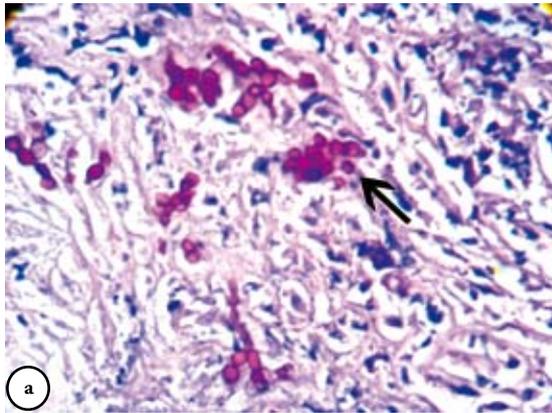


Figure 4 - Necrotic brain tissue with chronic inflammatory cells and septate hyphae (Periodic Acid Schiff stain). a) 40 X optical zoom. b) 10 X optical zoom).

was an extra axial gray mass with some adhesions to the cortex. This mass was very firm with a leather consistency. The mass was completely extracted as separate fragments without any hemorrhage and sent to the laboratory. The histopathology showed that there was extensive necrotic tissue surrounded by inflammatory cells, especially longhouse giant and plasma cells. There were also small necrotic areas with surrounding glial cells (reactive gliosis). On Periodic Acid Schiff staining, yeast cells with abundant hyphae were seen at the main branch by an acute angle (Figure 4), and a diagnosis of aspergillosis infection was made. During the postoperative period she was given intravenous amphotericin β for 3 weeks, and then 6 months of oral itraconazole. She was followed up yearly, and during follow-up no headaches or seizure were reported, and there was no evidence of otitis media or increasing intracranial pressure. An MRI with

gadolinium (IV contrast) was carried out after 5 years and showed no mass or other abnormality.

Discussion. Aspergillosis is uncommon among immune competent hosts. Wasay et al in 2009⁴ also reported that it is rare to see cerebral aspergillosis in immune competent people in western literature. Among immunocompromised patients, Aspergillosis commonly invades the brain hematogenously from a pulmonary focus, and sometimes through the walls of the paranasal sinuses.² But in immunocompetent patients, there is usually an infected site near the cranial cavity such as the sinuses.^{2,5} As in our case, the possible source for transmission of the fungus was the repeated fungal infection of the middle ear as described by purulent discharges. The likely mechanism for infection was repeated washing of the external auditory canal

and large use of antibiotics; which predisposed her to fungal infections. There are reported mechanisms in which immune competent patients become predisposed to fungal infection. In India, poor nutritional status, indiscriminate use of antituberculous drugs, antibiotics, steroids, and parasitic infestations are important causes of reduced host defenses and fungal infections.² Among reports of brain aspergillosis in immune competent hosts,^{2,3,5-8} our report is unique as it presents cerebral aspergilloma with ear purulent discharges.

Diagnosis of aspergillosis in an immune competent host needs careful attention. Although it is located low down in the list of differential diagnoses, it should be considered as a possible diagnosis. Fungal infections can lead to meningitis, meningoencephalitis, vasculitis, abscess formation, and granuloma formation.² However, intracranial mass effects and increasing intracranial pressure in addition to inflammation of the cortex, which caused seizures, were the presenting signs and symptoms of our case. Subarachnoid hemorrhage, secondary to a ruptured fungal aneurysm, has been reported in very few cases,² and this did not appear in our case. The mortality range of this disease is different in different published series. However, a mortality rate of around 63% was reported in a recent article.⁸

A CT scan is always the first line to demonstrate the intracranial lesions. Varying radiological findings include large tumor-like enhancing granulomatous masses within the brain tissue, nodular meningeal granuloma, paranasal sinusitis, orbital masses with brain destruction, infections with vasculitis, and aneurysm formation.^{2,9} Making a decision with CT scan alone is difficult, and intracranial masses are better demonstrated by MRI. Aspergillomas have intermediate signal intensity for the granuloma, surrounded by perilesional edema on T2.^{5,9} The MRI findings of our case were similar to literature descriptions.

Total removal of the abscess is essential, and postoperative antifungal treatment is important. In nearly all reports, the patients have undergone surgery to remove the mass lesion (granuloma or abscess). Many reports have used amphotericin β , triazole derivatives, or both.^{1-3,5,7} Although amphotericin β was the first line therapy in some studies, a few reports considered that

amphotericin β -based therapy has poor clinical efficacy in cerebral aspergillosis.^{4,10} However, all the studies have agreed on the efficacy of triazoles, such as itraconazole and fluconazole. A recent study⁴ showed pre surgical treatment with antifungal agents (especially itraconazole) had better outcomes after the surgery. However, a high index of suspicion is necessary to use these agents.

In conclusion, brain aspergillosis should be considered in patients with massive or persistent ear purulent discharges and neurologic signs and/or symptoms.

References

1. Walsh TJ, Anaissie EJ, Denning DW, Herbrecht R, Kontoyiannis DP, Marr KA, et al. Treatment of aspergillosis: clinical practice guidelines of the Infectious Diseases Society of America. *Clin Infect Dis* 2008; 46: 327-360.
2. Dubey A, Patwardhan RV, Sampth S, Santosh V, Kolluri S, Nanda A. Intracranial fungal granuloma: analysis of 40 patients and review of the literature. *Surg Neurol* 2005; 63: 254-260.
3. Marinovic T, Skrlin J, Vilendecic M, Rotim K, Grahovac G. Multiple Aspergillus brain abscesses in immuno-competent patient with severe cranio-facial trauma. *Acta Neurochir (Wien)* 2007; 149: 629-632.
4. Wasay M, Patel J, Azam I, Khan MA, Smego RA Jr. Preoperative antifungal therapy may improve survival in patients with Aspergillus brain abscess. *Clin Neurol Neurosurg* 2009; 111: 565-567.
5. Urculo E, Aranzadi MJ, Ruiz I, Villanua J. Aspergillus granuloma of the cavernous sinus: magnetic resonance imaging with pathologic correlation. *Acta Neurochir (Wien)* 2005; 147: 341-342.
6. Gunaratne PS, Wijeyaratne CN, Chandrasiri P, Sivakumaran S, Sellahewa K, Perera P, et al. An outbreak of Aspergillus meningitis following spinal anaesthesia for caesarean section in Sri Lanka: a post-tsunami effect? *Ceylon Med J* 2006; 51: 137-142.
7. Jayashree P, Puranik R, Kulkarni MH. Cerebral aspergilloma presenting as atypical meningioma in an immunologically competent patient: a case report. *Indian J Pathol Microbiol* 2007; 50: 367-369.
8. Kleinschmidt-DeMasters BK. Central nervous system aspergillosis: a 20-year retrospective series. *Hum Pathol* 2002; 33: 116-124.
9. Mafee MF, Tran BH, Chapa AR. Imaging of rhinosinusitis and its complications: plain film, CT, and MRI. *Clin Rev Allergy Immunol* 2006; 30: 165-186.
10. Schwartz S, Ruhnke M, Ribaud P, Reed E, Troke P, Thiel E. Poor efficacy of amphotericin B-based therapy in CNS aspergillosis. *Mycoses* 2007; 50: 196-200.

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