Coccidioidomycosis brain abscess

Case report

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► Coccidioidomycosis is an infection originating in the San Joaquin Valley of southern California, but is now seen with increasing frequency throughout southern California and the southwestern United States. A central nervous system involvement is usually manifested as meningitis.

The authors present the case of a young man with pulmonary coccidioidomycosis who developed a brain lesion that proved to be a coccidioidal abscess. This manifestation may now be more frequently seen and therefore should be included in the differential diagnosis of any patient presenting with a brain mass who is from an area in which this disease is endemic.

KEY WORDS · coccidioidomycosis · brain abscess

OCCIDIOIDOMYCOSIS is endemic in areas of the southwestern United States, with the highest incidence in California's Central Valley and parts of Arizona. Recently the incidence in California has risen dramatically.²

This disease is acquired by inhalation of the airborne arthroconidia of the organism, which reside in the soil of lower life zones of the Sonoran Desert. Pulmonary manifestations are most common and are usually self-limited. Extrapulmonary dissemination occurs infrequently (less than 1% in whites), and most commonly manifests as skin lesions, osteomyelitis, or meningitis. The most common central nervous system (CNS) manifestation of coccidioidomycosis is meningitis. Reports of parenchymal CNS lesions are extremely rare. 3,4

Case Report

This 19-year-old right-handed Latino man, a resident of Los Angeles, was admitted to the hospital after a generalized tonic-clonic seizure. The patient denied prior headaches, localized weakness, memory difficulties, recent cough, fever, or weight loss. He had not used drugs or alcohol since undergoing treatment for polysubstance abuse 6 months prior to admission. At that time, the patient had been incarcerated at a minimum security prison farm in the northern San Fernando Valley where his duties included field work. There was no history of intravenous drug use.

Examination and Treatment. A general physical examination was unremarkable, and the patient appeared healthy. A neurological examination found no deficits. A chest roentgenogram demonstrated several scattered small nodular densities bilaterally in the midlung fields and a 2×2 -cm thin-walled cavitary lesion in the right midlung field. A gadolinium-enhanced magnetic resonance (MR) image of the brain revealed a 2×3 -cm intra-axial multiloculated cystic lesion in the medial and upper portion of the right frontal lobe with marked edema adjacent to the lesion (Fig. 1A). Intravenous administration of gadopentetate dimeglumine showed a confluence of multiple ring-enhancing areas contiguous and adjacent to the falx cerebri with minimal enhancement to the adjacent falx (Fig. 1B).

A lumbar puncture was performed with a normal opening pressure, and cerebrospinal fluid (CSF) was obtained and found to be normal; bacterial and fungal cultures yielded negative results. Coccidioidal complement fixation antibody was negative in CSF but positive in serum at a 1:8 ratio. Bronchoscopy with bronchoalveolar lavage was performed, and the cultures obtained eventually grew *Coccidioides immitis*. A test for human immunodeficiency virus was negative. A three-phase, whole-body bone scan revealed multiple sites of abnormal uptake including the right parietal calvaria. The patient was treated with fluconazole after the fungal culture results were obtained. Amphotericin was added after 1 week.





Fig. 1. Preoperative T_2 -weighted magnetic resonance images, axial (A) and coronal (B). A: Gadolinium-enhanced image showing marked brain edema and a multiloculated lesion in the medial and upper portion of the right frontal lobe adjacent to the falx cerebri. B: Postcontrast image showing a confluence of multiple parafalcine abscesses with associated minimal focal dural (falcine) enhancement.

Despite the rarity of intraparenchymal lesions due to coccidioidomycosis, the lesion seen on the MR image indicated that surgical drainage and/or resection offered the best prospect for definitive diagnosis and cure.

Operation. The patient underwent a right frontoparietal craniotomy. The lesion was localized using intraoperative ultrasonography. The capsule of the lesion was identified and incised through a corticectomy. Once opened, white purulent material issued from the capsule's center; *C. immitis* ultimately grew from this intraoperative pus specimen. Pathological specimens showed brain necrosis and inflammation.

Discussion

This case of a patient with coccidioidal brain abscess without meningitis is the first known case of an intraparenchymal mass lesion caused by this organism in a nonimmunocompromised person. Since the advent of computerized tomography (CT), only two cases of intracranial coccidioidal mass lesions have been described. One case involved a 68-year-old woman presenting with unilateral ophthalmoplegia who had a primary intrasellar coccidioidal granuloma simulating pituitary adenoma.3 Another case involved a patient with acquired immunodeficiency syndrome who, after a prolonged illness,4 was found at autopsy to have a 5-mm lesion containing spherules of C. immitis. In one large series of coccidioidal meningitis cases, parenchymal lesions were rare and there was no mention of abscess.5

There were no apparent underlying causes to explain why the patient manifested this rare form of disseminated coccidioidomycosis. Despite bone scan evidence of involvement of the skull, there was no contiguous spread of disease from bone. It is probable that the lesion formed from hematogenous seeding of brain parenchyma. The frontal location of the lesion allowed it to attain a large size prior to causing a generalized seizure.

In 1991 and 1992 there were threefold and 10-fold increases, respectively, in the number of cases discov-

ered by serological testing in California which were reported to the Centers for Disease Control and Prevention compared with the annual number of cases reported since 1986.² The rising incidence is believed to be caused by drought followed by rain and summertime winds, which promote the growth and spread of the infective form of the organism.⁶ It is therefore not surprising that unusual expressions of this disease may now be seen.

The patient's major risk factor for acquisition of coccidioidomycosis was field work at the prison farm in the northern San Fernando Valley 6 months prior to presentation. Latino ethnicity is a possible risk factor for dissemination. The absence of respiratory symptoms despite evidence of active pulmonary disease may not be unusual as it is estimated that 60% of initially acquired infections are asymptomatic.⁶

Treatment Considerations

Traditionally, intravenous amphotericin B is used for the treatment of disseminated coccidioidomycosis. Intrathecal administration of amphotericin B is usually employed for treatment of meningitis because very poor CSF levels of the drug are attained with intravenous use alone, and failure rates are high.⁵ The recently introduced azole class of antifungal agents is a promising alternative treatment. Ketoconazole is ineffective for CNS disease but some encouraging results have been obtained with fluconazole, especially in doses over 400 mg per day.⁶ Fluconazole is well absorbed and attains high CSF levels.⁷

Clinical experience in the use of fluconazole is extremely limited, and there is almost no experience with it in the treatment of coccidioidal brain abscesses; however, it was thought that fluconazole might provide the best achievable parenchymal level of an effective antifungal agent. Other factors included the concern that the patient might not comply with the outpatient amphotericin B treatment, and that the surgery might seed the meninges and lead to meningitis (serial CSF examinations failed to reveal evidence of this). Intrathecal amphotericin B was considered but deemed unlikely to contribute in the treatment of intraparenchymal disease. Even with optimum antifungal therapy, coccidioidal infection is extremely difficult to eradicate. In our patient, a complete surgical resection was attempted to enhance the likelihood of cure.

Follow-up MR imaging demonstrated that, while most of the lesion was gone, a small area of enhancement persisted, suggesting residual infection. Repeat serial CT scans have demonstrated apparent gradual resolution of the lesion.

Although this is the first documented case of a coccidioidal brain abscess in an immune-competent patient, one consequence of the present epidemic of coccidioidomycosis may be that this manifestation of the infection is more frequently seen.

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