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Coccidiomycosis of the Central Nervous System

Suresh J. Antony*

Department of Medicine, Division of Infectious Diseases, Texas Tech University School of Medicine, El Paso, Texas, USA

Introduction

Coccidiomycosis is a common cause of fungal infections in non-compromised and immuno compromised patients, which is endemic to the Southwest United States, Northern Mexico and parts of New Mexico. It causes approximately 100,000 infections per year of which 200-300 are as result of Coccidiomycosis [1,2].

However, several cases have been reported in non-endemic areas. These infections may have primarily been acquired from transient stays in endemic areas. There are two species of *Coccidioides*, which cause infections in humans. The most common is *Coccidioides immitis*, which is endemic in California, and the second species is *Coccidioides posadasii*, which is more common in Texas, Central America and South America [3]. The clinical presentations in both species do not appear to be different.

Its primary presentation is usually pulmonary but on occasion it can disseminate and cause meningeal and brain involvement [4].

Meningitis is the most severe form of dissemination and is found in a large percentage of individuals with disseminated disease [5,6]. It usually occurs weeks to months after the primary infection. The onset of meningitis is usually sub-acute and presents with a myriad of clinical symptoms including headache, meningismus, altered mental status and occasionally cranial nerve abnormalities. Involvement of the cranium has been reported rarely. It is associated with a high morbidity and mortality and is often fatal.

The symptoms vary according to the site and the extent of the disease process. Complications of neuro Coccidiomycosis infection include brain abscesses and vasculitis [1,2,7]. Occasionally, brain infarction, spinal arachnoiditis may be a complication of this disease and may be due to inflammation of small- to middle-sized blood vessels [8]. Venous and dural thrombosis may also been occasionally been reported to occur in a minority of patients.

Physical examination will vary depending on the severity of the infection and may range from meningismus in ~50%of the cases to being asymptomatic except for headaches. Gait abnormalities and hydrocephalus may also been seen in a minority of cases both treated and untreated.

The CSF in coccidioidal meningitis shows evidence of pleocytosis with cell counts that are variable. The majority of cells are lymphocytic, but a predominance. Eosinophil's are not common, but if present are highly suggestive of coccidioidal meningitis [2,9].

The CSF protein level is usually elevated with a low glucose level.

If the organisms are observed either in the mycelia or arthrocondial forms on direct microscopic examination of the CSF it usually suggests an unusually high meningeal fungal burden. Coccidioidal IgG antibody in CSF if found is samples is virtually diagnostic. In some studies DNA specific probes have been used to make the diagnosis in difficult cases [10].

Imaging studies can be helpful in adding to the diagnosis of neurooccidiosis .MRI with contrast seems to identifying the typical basilar cisternal enhancement, spinal arachnoiditis and abscesses much better than CAT scans.

Treatment of neurococcidiosis is extremely difficult with high rates of relapse. Fluconazole, voriconazole and liposomal amphotericin are the drugs of choice [11-13].The echinocandins such as caspofungin has been used to treat this condition in a few reported cases. Some of the non-approved drugs that have been used successfully to treat coccidiomycosis include some of the newer azoles such as posaconazole [14].

Most recent data suggest that high-dose fluconazole (800-1200 mg once per day) should be the preferred treatment in patients with neurococcidiosis [15]. Voriconazolehas occasionally been used as salvage therapy in patients who have failed fluconazole or in patients with severe disease and who are immune compromised [16,17].

Ventriculoperitoneal shunting may have to be used when hydrocephalus develops. If vasculitic infarction develops there appears to be some improvement in neurologic status when high dose steroid therapy is used.

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***Corresponding author:** Suresh J. Antony, 1205 N. Oregon, El Paso, Texas 79902, USA, Tel: 9155334900; Fax: 915 5334902; E-mail: suresh.antony@att.net

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