

Disseminated Coccidioidomycosis of the Spine in an Immunocompetent Patient

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Abstract

Coccidioidomycosis infections result from inhalation of the dimorphic fungus *Coccidioides immitis*. Coccidioidomycosis typically is benign, but its extremely rare disseminated form can result in significant morbidity and mortality. Dissemination of the fungus to the spine is difficult to control and usually requires an aggressive combination approach (surgical/medical).

In this article, we report the case of a 27-year-old Indonesian man with vertebral osteomyelitis caused by disseminated coccidioidomycosis. We outline the case management (includes 30-month follow-up) and review the treatment recommendations.

The patient presented with an unstable C5 pathologic fracture caused by *C immitis*. After corpectomy and stabilization of the cervical spine along with antifungal therapy with amphotericin B and oral fluconazole, he developed multiple complications.

This case illustrates some of the potential pitfalls in managing spinal osteomyelitis caused by *C immitis* and the need for continuous medical therapy after surgical treatment.

Coccidioidomycosis is a fungal infection caused by the dimorphic fungus *Coccidioides immitis*. *Coccidioides* species are endemic in the southwestern United States and sporadic in Mexico and Central and South America. Infection takes a respiratory route. Less than 5% of pulmonary infections have complications and long-term pulmonary sequelae, and less than 0.5% of infections result in dissemination.¹ Osteomyelitis accounts for 20% to 50% of disseminated extrapulmonary *Coccidioides* infection, with the vertebra being the most common site of infection.²

The case reported here illustrates the challenges and potential sequelae of disseminated coccidioidomycosis of the spine. The patient provided written informed consent for print and electronic publication of this case report.

Case Report

A 27-year-old man presented with a 4-month history of neck pain that had begun intensifying over the past few days. The

patient, originally from Indonesia, had been living in Ohio but had spent 6 months in Arizona. He denied shortness of breath, fever, chills, and neurologic deficit. Physical examination revealed midline cervical tenderness with limited range of motion, normal sensation, motor 5/5 in all key muscle groups, and deep tendon reflexes (grade 2). White blood cell (WBC) count was 10,900/ μ L, erythrocyte sedimentation rate (ESR) was 36 mm/h, and C-reactive protein (CRP) level was 8.9 mg/L. HIV test result was negative.

Computed tomography (CT) of the cervical spine showed near complete destruction of the C5 vertebral body with focal kyphosis (Figure 1). Magnetic resonance imaging (MRI) of the

Figure 1. Computed tomography sagittal reformat image shows near complete destruction of C5 vertebral body with focal kyphosis.



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Figure 2. T₂-weighted magnetic resonance imaging of cervical spine shows large retropharyngeal abscess extending from C3 to C6 and posterior abscess extending over C2–C4 spinous process with no evidence of epidural abscess or spinal cord compression.



Figure 3. Patient's left flank: swelling with overlying open wound.

cervical spine showed destruction of the C5 vertebral body with a large retropharyngeal abscess extending from C3 to C6 and a posterior abscess extending over the C2–C4 spinous process (Figure 2). There was no evidence of epidural abscess or spinal cord compression. MRI of the thoracic and lumbar spine showed increased signal intensity in multiple vertebral bodies along with the sacrum and ilium with no evidence of epidural or paraspinal abscess. CT-guided needle biopsy specimen grew *C immitis*. Given the near complete destruction of the C5 vertebral body and the focal kyphosis, the surgeon drained the retropharyngeal abscess, performed C5 corpectomy and

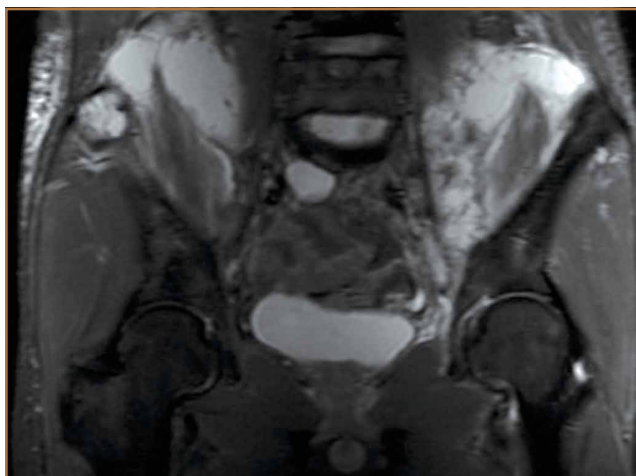


Figure 4. T₂-weighted coronal magnetic resonance imaging shows large granuloma mass extending deep into pelvis, involving psoas and iliacus muscles, and communicating with left flank wound.

C4–C6 arthrodesis with fibular allograft, and placed instrumentation. There was no indication for surgical management of the thoracic spine or the lumbar spine, as there was no instability or abscess. Infectious Diseases was consulted, and the patient was placed on intravenous amphotericin B for 6 weeks with a plan to continue oral fluconazole for life.

Thirteen months after cervical spine surgery, the patient presented with a right-side draining anterior neck wound and a left-side anterior neck abscess. Wound culture grew methicillin-susceptible *Staphylococcus aureus* (MSSA) and *C immitis*. CT and MRI showed maintained cervical alignment and fusion of interbody fibular allograft. However, there was further destruction of the lamina and the right facet joints of C5–C7, and a large retropharyngeal abscess had developed. CT and MRI showed dissemination of infection into multiple vertebral bodies, the ribs, and the sacrum, along with a large presacral abscess. The surgeon surgically drained the retropharyngeal abscess and percutaneously drained the presacral abscess. Despite extensive involvement of multiple spine segments, the spine remained structurally stable, and no further surgical treatment was indicated at this stage. The patient said he had been adhering to the fluconazole regimen. He underwent re-treatment with intravenous amphotericin B for several weeks and then was discharged on itraconazole 200 mg twice daily for life.

Two years after initial surgery, the patient presented to the emergency department with large swelling and a wound in the left flank (Figure 3). MRI showed the wound communicating with a large granuloma mass extending deep into the pelvis (Figure 4). CT showed lytic lesions in the sacrum, the ilium, and the acetabulum (Figure 5). A needle-biopsy specimen grew *C immitis* and MSSA. Doxycycline and voriconazole were started. Six weeks later, the patient was seen in the infectious diseases clinic with shortness of breath and cough for 1 week. He was readmitted to the hospital and underwent



Figure 5. Computed tomography of pelvis shows lytic lesions in sacrum and ilium.



Figure 7. Groin wound in left flank is healing. There is no wound discharge.



Figure 6. Computed tomography of cervical spine shows maintenance of cervical alignment and fusion of interbody fibular allograft.

thoracostomy to drain a pleural effusion. He continued to receive posaconazole in addition to experimental therapy with interferon gamma (IFN- γ). At final follow-up, 4 years after initial presentation, the patient was neurologically intact, there was no axial spine or radicular pain, and the spine remained stable (Figures 6, 7).

Discussion

Coccidioidomycosis was first described in California's San Joaquin Valley region, leading to the term *Valley fever*. Patients with *Coccidioides* infections do not require isolation and do not pose

an infectious risk to the surgical or medical staff.² Most infections are asymptomatic and self-limited. Only 33% of infected patients will have mild self-limited respiratory illness. Less than 5% will have a complicated lung infection. Hematogenous dissemination seldom occurs. Of the less than 1% of patients who develop the disseminated form of coccidioidomycosis, about half will present with vertebral involvement.³⁻⁶ Risk factors for dissemination include African, Filipino, Asian, and Hispanic descent, impaired T-cell function, and pregnancy.

The characteristic feature of spinal involvement is a lytic lesion in the vertebral body with sparing of the disc space.⁷ Rarely, a coccidioidal granuloma can cause spinal cord compression and even quadriplegia.⁸ Although the patient we describe here had extensive involvement of the spinal column with multiple paraspinous abscesses, he did not have any epidural abscess or neurologic symptoms.

Prompt diagnosis is important in controlling the infection. However, laboratory workups are often normal, delaying the diagnosis. In the majority of cases, plain radiographs of the chest are normal.³ Therefore, taking a detailed history (paying close attention to travel history) and performing a comprehensive physical examination are essential in the initial workup in cases of suspected coccidioidomycosis. Our patient was immunocompetent and without any prior medical history. WBC count and ESR were only slightly elevated, but CRP level was significantly elevated. The patient's risk factors were residence in an endemic area and Indonesian descent.

The Infectious Diseases Society of America (IDSA) published treatment guidelines for coccidioidomycosis in 2005.² The consensus statement covers these principles:

1. Oral azole antifungal agents are initial drugs of choice.
2. Amphotericin B is usually reserved for patients with lesions that are worsening rapidly or are located in vital sites, such as the spine.
3. In some cases, surgical débridement or stabilization is important or even crucial as adjunctive treatment.

Because cellular immunity is important in the immune control of coccidioidal infection, there has been interest in using IFN- γ for disseminated infection or other serious complications, though the efficacy of this approach has not been proved. IFN- γ is a lymphokine capable of enhancing the immune response in fungal infections, presumably by activating macrophages and improving WBC phagocytic properties. IFN- γ has been shown to increase the fungicidal capabilities of tissue macrophages, enabling them to kill *C immitis* in vitro.⁹ The patient in this report was treated with a variety of antifungals, which failed to result in significant improvement because of nonadherence or drug resistance. Over the past few months, he continued receiving posaconazole in addition to experimental IFN- γ therapy, and these helped improve groin mass and ulcer.

Management of vertebral lesions is especially important because of their potential impact on the spinal cord and mobility. For some lesions, infection control requires surgical débridement and stabilization. Immediate surgical decompression is usually recommended for patients with evidence of cord impingement. For patients with stable vertebrae and without cord compression, medical treatment is often initiated without immediate surgical intervention. Subsequent management depends on the evolution of lesions, as determined by neurologic examination and repeat MRI (often within 2 months). For progressive lesions, surgical options are reconsidered. For lesions that are stable or show improvement, medical management alone is continued, with repeat MRI at progressively longer intervals. Our patient's initial presentation was neck pain without neurologic deficit. Given the near complete destruction of the C5 vertebral body and the focal kyphosis, the lesion was deemed unstable, and the surgeon drained the retropharyngeal abscess, performed C5 corpectomy and C4–C6 arthrodesis with fibular allograft, and placed instrumentation. Despite there being multiple lesions in the spine during the 30-month follow-up for the index procedure, there was no indication for surgical management of the thoracic or lumbar spine, as there was no instability or abscess.

This case report illustrates the medical and surgical management options for disseminated *Coccidioides* infection and the potential devastating complications of inadequate infection control. Despite our patient's significant imaging findings, he did not develop an epidural abscess or spinal compression, and he remained neurologically intact, with no axial spine or radicular pain. His spine remained stable as well.

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