CLINICAL VIGNETTE

An Unusual Case of Extrapulmonary Coccidioidomycosis

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Case Presentation

A 38-year-old man initially presented to an outside hospital for chills, night sweats, and weight loss. Eight weeks prior he reported having an upper respiratory infection with cough and fever. He was initially treated with a course of oseltamivir without improvement. Due to the persistence of a cough, he received subsequent courses of azithromycin then levofloxacin. His cough improved, but he developed intermittent chills, night sweats, abdominal bloating and pain with 10lb weight loss over the six weeks. At this point he presented to the outside hospital. CT imaging was remarkable for a left lower lobe (LLL) consolidation, large volume ascites, and omental thickening. He underwent 2 paracenteses with negative microbiology and cytology followed by a colonoscopy and EGD, which were unremarkable. Due to the peritoneal findings, he underwent exploratory laparotomy with operative report noting gross carcinomatosis over the peritoneum and omentum. He was discharged with a plan to follow-up pathology results and was scheduled to see oncology as an outpatient.

Two weeks after discharged, he developed right lower extremity (RLE) and scrotal swelling and presented to another emergency department and was admitted for further evaluation. Admission physical examination was notable for mild abdominal distension, diffuse scrotal edema, and 1+ RLE edema. Cardiac and pulmonary exams were unremarkable. Laboratory studies were remarkable only for mild anemia (11.4 g/dL) and hypoalbuminemia (2.4 g/dL). Lower extremity duplex and scrotal ultrasound were unremarkable. CT Chest showed scattered tree-in-bud opacities in the LLL with a resolving cavitary lesion, and CT Abdomen/Pelvis revealed moderate ascites with omental thickening and nodularity.

Given the history of constitutional symptoms and findings on the CT Chest, testing for atypical infectious etiologies was initiated. Pulmonary tuberculosis evaluation returned negative. AFB smears Coccidioidomycosis serologies were remarkable for an elevated IgG, low positive IgM, and were positive for antibodies against TP antigen, indicating a *Coccidioides* infection likely in the past few months. Antibody complement fixation was markedly elevated at 1:128. Final pathology from the outside showed acute inflammation with rare granulomas, negative for malignancy. Unfortunately, tissue cultures were not sent. On further questioning, he reported significant wildfire exposure in the vicinity of his home 2 weeks prior to initial respiratory symptoms. He was started on fluconazole and discharged with plan for infectious-disease follow-up.

Discussion

Coccidioidomycosis an infectious disease caused by the inhalation of spores from the fungus *Coccidioides*. Initial cases were described in agricultural workers from Central California, including the San Joaquin Valley from which valley fever, an acute respiratory illness due to *Coccidioides*, derives its name.[1,2] Coccidiomycosis remains common in the Southwestern United States, particularly in Arizona and California. Overall incidence continues to increase since 2014 and in recent years has been more frequently reported in areas not previously thought to be endemic with population growth patterns and climate changes hypothesized to be playing a role.[3,4]

While *Coccidioides* exposure with development of coccidiomycosis can occur in endemic areas, outbreaks due to situational exposures have been described, particularly with soil disruption. These include exposures from desert military operations, archaeology field studies, construction, and firefighting.[5,6] More recently, wildfire smoke exposure has been associated with an increase in hospital related admissions for coccidioidomycosis infections.[7]

It is estimated that symptoms develop in 40% of cases, with the majority presenting as an acute respiratory infection, typically 1-3 weeks after exposure. The infection is often indistinguishable from other community acquired respiratory illnesses.[2,3] In addition to an acute pneumonia, there are several other clinical manifestations of coccidioidomycosis that are generally classified as pulmonary or extrapulmonary in nature.[1,2] Severity of disease can vary due to individual differences in immunologic response with more severe involvement presenting with rash, fatigue, night sweats, and weight loss.[1,2,8,9] Pulmonary manifestations include acute pneumonia, chronic progressive pneumonia, pulmonary nodules, and cavitary lesions.[1,2]

Extrapulmonary manifestations, also referred to as disseminated disease, are estimated to occur in less than 1% of *Coccidioides* infections.[9,10] Extrapulmonary involvement is differentiated as meningeal or nonmeningeal.[1,9] Coccidioidal meningitis is considered one of the most severe manifestations

with a high morbidity and mortality. Patients with known history of coccidioidomycosis who present with neurologic symptoms should undergo further evaluation with cerebral spinal fluid sampling to evaluate for central nervous system involvement.[2,8] Management is more intensive with recommendations for life long therapy.[9] Nonmeningeal disseminated coccidiomycosis can present similarly to other malignant, infectious, or granulomatous processes and can involve the skin and soft tissue, bones, and rarely the peritoneum and visceral organs.[2,8]

Peritoneal coccidiomycosis in particular is an exceedingly uncommon manifestation hypothesized to occur through lymphatic or hematogenous spread.[11,12] Two prior case reviews evaluating 34 cases from 1939-2015 found mean age at diagnosis of 38.2 years with a male predominance (76%), and 21% without significant prior medical history. Abdominal distension was the most common presenting symptom.[11,13] Patients may present with vague symptoms including nausea, vomiting, abdominal pain, and abdominal distension. CT imaging is often notable for ascites (frequently loculated), peritoneal thickening, and nodularity often indistinguishable from peritoneal tuberculosis or peritoneal carcinomatosis.[11,14] Interestingly a more recent case review of peritoneal coccidiomycosis, reported only 40% of cases with a known history of preceding pulmonary coccidiomycosis and none of the cases noted concurrent active pulmonary disease at time of diagnosis.[14] Given the rarity of the diagnosis, treatment recommendations are based mainly on case reports with most recommending azole therapy.[9,11,14] One case report demonstrated fluconazole achieved higher concentrations in peritoneal fluid than amphotericin B.[15] Duration of therapy is often years and at least 2 years of post-treatment serologic monitoring is recommended for disseminated coccidiomycosis.[9] In small case series with known outcomes, the majority of patients with peritoneal coccidiomycosis were reported to have favorable responses with treatment.[9,14]

Conclusion

Peritoneal coccidiomycosis is a rare manifestation of a *Coccidioides* infection that can present with non-specific abdominal symptoms and mimic peritoneal carcinomatosis on imaging. Proper diagnosis requires a high index of suspicion based on geographic risk factors and potential clinical history compatible with prior pulmonary coccidiomycosis, which may precede abdominal symptoms by weeks to months. Long term azole therapy is the most often recommended treatment.

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