

# Coccidioidal Hepatic Abscess in a Patient with Disseminated Coccidioidomycosis: A Case Report

Nadia Raza, MD, Arash Heidari, MD, Faisal Nasrawi, MS, Rasha Kuran, MD, Navinchandra Amin, MD, Royce H. Johnson, MD  
Kern Medical/Valley Fever Institute

## Abstract

- Coccidioidomycosis is an infection caused by inhalation of arthroconidia produced by dimorphic fungi in the genus *Coccidioides*.
- Forty percent of patients with coccidioidomycosis develop a self-limited respiratory infection.
- However, 5% of these individuals develop extrapulmonary dissemination.
- Dissemination to liver frequency is unknown and is only limited to a few published case reports presenting as granulomatous hepatitis.
- Here is a case of disseminated Coccidioidomycosis, who presented for symptoms of recurrent pneumonia.
- Upon evaluation, the patient was found to have a hepatic abscess for which he underwent percutaneous drainage.
- Culture grew *Coccidioides immitis*, and the patient was treated with systemic antifungal.
- This is a rare case of disseminated Coccidioidomycosis in the liver.

## Background

- Coccidioidomycosis is a fungal infection that is endemic to the Southwestern region of the United States.
- It is caused by inhalation of spores of *Coccidioides immitis* and *Coccidioides posadasii*.
- It is a common endemic fungal infection in the United States, and has a wide spectrum of clinical manifestations, from asymptomatic to fatal disease.
- The portal entry is usually pulmonary and presents as flu-like symptoms and pneumonia.
- In minority of cases, extra pulmonary dissemination occurs to skin, joints, bones and the central nervous system (CNS)<sup>[1][2][3][4][5]</sup>.
- Dissemination to liver frequency is unknown and is only limited to a few published case reports presenting as granulomatous hepatitis<sup>[6]</sup>.

## Case Presentation

- A 50-year-old male with type 1 Diabetes mellitus, end-stage renal disease (ESRD) on hemodialysis. He was originally diagnosed with pulmonary coccidioidomycosis in 2005 and in 2007 was found to have disseminated tibial osseous and coccidioidomycosis meningitis. Patient was previously treated with Amphotericin B that was transitioned to voriconazole.
- In 2020, Patient was experiencing subjective intermittent fevers, cough, and dyspnea for 2 months and received 2 courses of treatment for community acquired pneumonia (CAP) without improvement. He presented to our Emergency Department (ED) with low grade fever and leukocytosis of  $15.5 \times 10^3/\text{mcl}$  with neutrophilia.
- Liver tests showed alkaline phosphatase of 219, aspartate aminotransferase (AST) of 99, alanine aminotransferase (ALT) of 45, albumin 1.9, and total protein 6.5 and viral hepatitis work up was negative. *Coccidioides* immunodiffusion IgG and IgM assays were both reactive with complement fixation of >1:512. Chest X-ray in the ED showed diffuse patchy and confluent right greater than left airspace disease with consolidation and micronodular densities (Figure 1).
- Chest CT scan revealed diffuse patchy right lung airspace disease with ground glass opacities. As the patient presented during SARS 2 COVID-19 pandemic, COVID testing was performed and returned negative. CT chest also showed an accidental collection in the liver (Figure 2). As a result, then CT abdomen was obtained and demonstrated a rim enhancing hepatic septate collection measuring 7.3 x 6.8 x 5.4 cm (Figure 3)
- Patient underwent an ultrasound guided percutaneous drainage and sampling of the hepatic collection with placement of a percutaneous drain. PAS staining of the fluid showed multiple spherules with endospores resembling coccidioidomycosis with no bacteria isolated as shown in (Figure 4). Gram stain showed spherules resembling *Coccidioides* sp (Figure 5). Fungal culture eventually grew and was sent to reference fungal laboratory (University of Texas at San Antonio) where growth of *Coccidioides immitis* was confirmed. Antifungal susceptibility testing at the same reference fungal laboratory for Amphotericin B, 5-Fluorocytosine, Fluconazole, Itraconazole, and Voriconazole MICs were  $\leq 0.03$ , >64, 8, 0.06, and 0.125 mcg/mL, respectively.
- Parental treatment with liposomal amphotericin B was discussed with the patient but he deferred. Therefore, he was switched from oral voriconazole to oral Isavuconazonium 372mg daily and discharged with close follow up with the cocci clinic.

## Methods

- Approval was obtained from the Institutional Review of Board of Kern Medical with IRB # 20021.
- A retrospective review of patient record was performed.
- A literature search was conducted on PubMed, Google Scholar, Infectious Disease society of America (IDSA)'s Clinical infectious disease Journal database.
- The following search terms were applied: Coccidioidomycosis, Disseminated coccidioidomycosis, Hepatic abscess, Coccidioidomycosis involving liver.

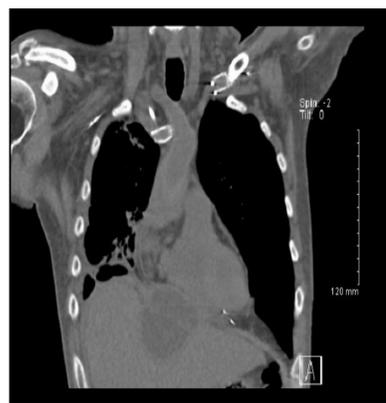
## Discussion

- Hepatic Abscess (HA) is usually bacterial, less commonly parasitic, rarely fungal. When faced with HA, one should seek advice from a multi-specialty team including a hepatobiliary surgeon and an infectious disease specialist.
- Needle aspiration and microbiology is a valuable approach.
- Coccidioidomycosis is usually self-limiting in most immunocompetent hosts.
- It is estimated that more than 60% of infections are asymptomatic.<sup>[7]</sup>
- Involvement of the liver in disseminated coccidioidomycosis is probably common.
- In most instances this is subclinical and suspected 5'-nucleotidase and alkaline phosphatase are elevated.
- Symptomatic hepatic involvement in coccidioidomycosis is rare.<sup>[8]</sup> There is limited literature regarding symptomatic liver involvement, those reported are typically immunocompromised and have long standing systemic coccidioidomycosis.
- This patient suffered lifelong diabetes, ESRD, as well as his 15-year history of disseminated coccidioidomycosis.
- Coccidioidal hepatic abscess is clearly rare and this is the first case report to the best of our knowledge.
- The literature regarding therapy of other fungal liver abscess may have some insight to offer how to treat coccidioidomycosis liver abscess.
- Cases of hepatosplenic candidiasis that were successfully treated with fluconazole have been reported by Kauffman et al.<sup>[9]</sup>.
- Our treatment approach should be modelled after treatment of disseminated coccidioidomycosis which is Initial use of liposomal Amphotericin B with transition to -azoles<sup>[10]</sup>.

## Imaging



**Figure 1:** Chest Xray showing diffuse patchy and confluent right greater than left airspace disease with consolidation and micronodular densities.



**Figure 2:** CT scan showing anterior hepatic septate collection measuring 7.3 x 6.8 x 5.0 cm.



**Figure 3:** CT scan abdomen showed a rim-enhancing, septate, cystic vs necrotic lesion centered in hepatic segment 4 measuring roughly 5.4 x 7.3 x 7.3 cm (AP x TV x SI) with associated delayed enhancement including delayed hyperenhancement of the rim and no associated capsular retraction.



**Figure 4:** Gram stain showing spherules.



**Figure 5:** KOH wet mount showing spherules.



**Figure 6:** KOH wet mount showing spherules.

## Conclusions

- This case report demonstrates that it is paramount for clinicians to maintain a high clinical suspicion to include disseminated coccidioidomycosis in the differential diagnosis of patients with exposure to endemic regions.
- Particularly for those who are immunocompromised and had coccidioidomycosis in the past.
- This case demonstrates a rare manifestation of disseminated coccidioidomycosis to the liver with abscess formation.
- As per our literature search first case to be reported.
- This case aids in providing details of a rare condition encountered with diagnostic and therapeutic approach.

## References

- Galgiani J. Coccidioidomycosis (*Coccidioides* Species). Harrison's Internal Medicine: Part III Infectious Diseases and Their Etiologic Agents. 2010;3:2974.
- Deresinski S, Mirels LF. Coccidioidomycosis: What a long strange trip it's been. Med. Mycol. 2019 Feb 01;57(Supplement\_1):S3-S15.
- Hung CY, Hsu AP, Holland SM, Fierer J. A review of innate and adaptive immunity to coccidioidomycosis. Med. Mycol. 2019 Feb 01;57(Supplement\_1):S85-S92.
- Taylor JW, Barker BM. The endozoan, small-mammal reservoir hypothesis and the life cycle of *Coccidioides* species. Med. Mycol. 2019 Feb 01;57(Supplement\_1):S16-S20.
- Thompson GR, Lewis JS, Nix DE, Patterson TF. Current Concepts and Future Directions in the Pharmacology and Treatment of Coccidioidomycosis. Med. Mycol. 2019 Feb 01;57(Supplement\_1):S76-S84.
- Howard PF, Smith JW. Diagnosis of disseminated coccidioidomycosis by liver biopsy. Arch Intern Med. 1983 Jul;143(7):1335-8. PMID: 6870405.
- Charles Edward Smith, and Rodney R. Beard "Varieties of Coccidioidal Infection in Relation to the Epidemiology and Control of the Diseases", American Journal of Public Health 36, no. 12 (December 1, 1946); pp. 1394-1402.
- Kuprian M, Schofield C, Bennett S. Symptomatic hepatitis secondary to disseminated coccidioidomycosis in an immunocompetent patient. BMJ Case Reports. 2014 Apr;2014. DOI: 10.1136/bcr-2013-202144.
- Kauffman CA, Bradley SF, Ross SC, Weber DR. Hepatosplenic candidiasis: successful treatment with fluconazole. Am J Med. 1991;91(2):137-141. doi:10.1016/0002-9343(91)90005-i.
- Coccidioidomycosis: a review Royce H Johnson, 1,2 Rupam Sharma , 1,2 Rasha Kuran, 1,2 Isabel Fong, 1,2 Arash Heidari 1.

## Acknowledgements

The author(s) do not have any acknowledgements.