Cavitary Pulmonary Lesions in an Immunocompromised Patient: A Comprehensive Differential Diagnosis in an Endemic Region

Shivam Chandra OMS3, Max Pfau, Jude Okafor,
PGY-1, Mark Loafman, MD

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[1]Shivam Chandra, [2]Max Pfau, [3]Jude Okafor, PGY-1, [3] Mark Loafman, MD
[1]A.T. Still University School of Osteopathic Medicine Arizona; [2]University of North Dakota, Department of Biology, [3]Cook County Family Medicine Department, Chicago, IL

Objective

- Highlight the **diagnostic challenges** of Cavitary pulmonary lesions in immunocompromised patients.
- Emphasize the importance of a **broad differential**, including bacterial, fungal, and noninfectious causes.
- Stress the **role of regional epidemiology** (e.g., histoplasmosis, blastomycoses) in guiding diagnosis and treatment.
- Illustrate the **need for early recognition, targeting, and prompt antifungal therapy.**
- Integrate **osteopathic principles** in optimizing systemic health and immune function for better outcomes.

Introduction

- Histoplasmosis and blastomycosis are systemic fungal infections endemic to the Ohio and **Mississippi River valleys**, including Chicago [1].
- Both infections are **acquired through inhalation of fungal spores** and present with **overlapping pulmonary findings**, such as cavitary lesions [1].
- **Histoplasmosis** (Histoplasma capsulatum) is the **most common systemic fungal infection in the U.S**. associated with bird or bat droppings in environments like caves, barns, and soil [1].
- **Blastomycosis** (Blastomyces dermatitidis) thrives in **moist soil and decaying organic matter, especially near waterways** [1].
- While **histoplasmosis is more common in urban areas like Chicago**, both infections should be considered in **patients with compatible clinical and imaging findings [1]**.

Contact

Shivam Chandra, OMS-III: shivam.chandra@atsu.edu
Max Pfau: Max.pfau@und.edu

Case Description

- Patient: 33-year-old male with type 1 diabetes mellitus (T1DM) presenting with diabetic ketoacidosis (DKA)
- **Initial evaluation:**
  - Severe **metabolic abnormalities:**
  - **pH**: 7.2
  - **Anion Gap**: 35
  - **Glucose**: 445 mg/dL (hyperglycemia)
  - **Potassium**: 5.7 mmol/L (hyperkalemia)
  - Treated with **IV fluids, electrolyte correction, and insulin therapy.**
- **Laboratory findings**
  - **Leukocytosis**: Platelets 16.6 x 10^3 µ/L
  - **Thrombocytosis**: Platelets 564 x 10^3 µ/L
- **Imaging:**
  - Chest X-ray and CT scan:
    - Cavitary lesions present
    - Right hilar mass-like opacity extending into the upper lobe
    - Additional lesions in the right lung apex and lower lobe
- **Diagnostic Workup**:
  - Infectious disease consultation
  - **Bronchoscopy with bronchoalveolar lavage (BAL) performed**
  - **Urine histoplasma antigen positive** (cross-reactive)
- **Management:**
  - **Started on liposomal amphotericin B**
  - Transitioned to **oral Itraconazole** (six-month antifungal therapy planned)

Figure 1

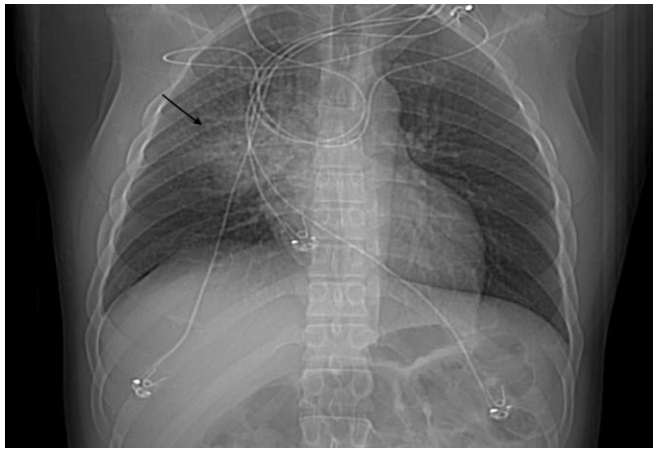

Figure 1: Presence of right hilar mass.

Discussion

- **Broad Differential Diagnosis:** This case highlights the importance of considering **bacterial, fungal, and noninfectious causes** of **cavitary lung lesions** in **immunocompromised patients**. The differential included **Nocardia, Mucor, Histoplasma capsulatum, Blastomyces dermatitidis, Mycobacterium tuberculosis, invasive aspergillosis, and granulomatosis with polyangiitis** [2,3].
- **Role of DKA in Immunosuppression: Diabetic ketoacidosis (DKA)** likely contributed to immunosuppression by **impairing phagocyte function, T-cell activity, and cytokine production** due to **hyperglycemia and oxidative stress**.
- **Osteopathic Perspective: Osteopathic principles** emphasize the integration of **systemic health and immune function**, providing opportunities to optimize outcomes in complex infectious cases [4].
- **Diagnostic Approach:** The **patient's imaging findings** and **regional epidemiology** supported **histoplasmosis** as the primary diagnosis [1,2].
- **Osteopathic Manipulative Treatment (OMT): OMT was deferred** due to the ongoing infection and lack of symptom improvement.

Outcomes/Conclusion

- Broad Differential is Essential:
  - Cavitary pulmonary lesions in immunocompromised patients require a comprehensive workup to distinguish between bacterial, fungal, and noninfectious etiologies.
  - Regional epidemiology must be considered, especially in endemic areas for histoplasmosis and blastomycosis.
- Early Diagnosis and Treatment Improve Outcomes:
  - Prompt initiation of liposomal amphotericin B followed by oral itraconazole led to clinical improvement and stabilization.
  - Close monitoring of itraconazole levels and follow-up with infectious disease specialists ensured appropriate treatment duration.

References

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