COCCIDIOIDOMYCOSIS

“Valley Fever”

By: Pamela Galioto, Katie Olenick, and Troy Adamson
Coccidioidomycosis

- Also known as San Joaquin fever, valley fever, and desert rheumatism
- Etiologic agents are
  - *Coccidioides immitis*
  - *Coccidioides posadasii*
Coccidioidomycosis Classification

- Kingdom: Fungi
- Phylum: Ascomycota
- Class: Euascomycetes
- Order: Onygenales
- Family: Onygenaceae
- Genus: Coccidioides
Coccidioides immitis/posadasii

• California and Non-California variants
• Morphologically identical
• Different rates of growth with high salt concentration
  - C. posadasii grows more slowly
• Inhabits more alkaline soil
• Truly pathogenic
  - Causative agent of true endemic mycoses
Geographical Distribution

- High temperatures, dry, little rainfall, low altitude
- *C. immitis* exclusive to San Joaquin valley (CA)
- *C. posadasii* found in desert in southwestern US, Mexico, and South America
- Approx. 10-50% population exposure in endemic regions
Life Cycle

**Phase 1 – Mycelial Arthrospore**
- Grow rapidly, but are less infectious
- Soil dries, develop arthrospores
- Disarticulate as a single arthroconidia
- Become airborne when disturbed by wind or soil.

**Phase 2 – Spherule Endospore**
- After inhalation, in infected tissues
- Thick-walled spherule with endospores form
- Release of endospores lead to new spherule formation
- Proliferation of disease
Epidemiology

Risk Factors –
• Live in endemic regions
• Activities with exposure to dust and soil
• Endemic regions with recent natural disasters
• Laboratory work with fungus

Prevention and Control –
• Proper handling of laboratory equipment
• Refrain from visiting endemic areas
• Do not engage in activities leading to exposure of dust and soil or disturbed land in endemic regions
Pathogenesis

- Airborne fungal infection
- Acquired by inhalation
- Usually presents as pulmonary infection
- Hematogenous spread causes infection in skin, bones, lymph nodes, adrenal glands, central nervous system
- Most cases make full recovery within weeks or months, but some may develop chronic pulmonary infection
- 60% of cases will have no symptoms
- Can also cause infection in animals
Diagnosis

- **Blood**
  - CBC w/ differential
  - Antibody titer

- **Imaging**
  - Chest x-ray or CT scan

- **Invasive Testing**
  - Biopsy of lung or lymph node
  - Bronchoscopy
Histopathology

• Sputum microscopic analysis
  – Dimorphic fungus: filamentous in soil, but spherule in tissue
  – The spherule is filled with numerous spherical endospores
  – Special stains will enhance visualization
    • Silver stain
    • Periodic Acid Schiff (PAS) stain
    • KOH smear

• Sputum culture
  – Gold standard of diagnosis
  – *Coccidioides immitis*
Clinical Manifestations

- Symptoms
  - Chest pain
  - Fever
  - Headache
  - Chest pain
  - Joint pain
  - Cough or hemoptysis
  - Erythema nodosum
    - Painful red, lumpy rash on legs

- Can begin from a few days to a few weeks after exposure
- Immunocompromised patients are susceptible to disseminated disease (spreads to skin, CNS or other organs)
Treatment and Management

• Pulmonary Coccidioidomycosis
  – Supportive measures are usually sufficient
    • Bed rest, fever reduction, symptomatic management
  – Antifungal medications usually not required

• Disseminated Coccidiomycosis
  – Prevention is the best treatment!
    • Avoid AIDS and other causes of impaired immunity
  – Antifungal medications are a necessity
    • Itraconazole, Fluconazole
  – This form still carries a high mortality rate
    • Meningitis is most severe form of disseminated disease
Case Report 1

• Immunocompetent patient, 9 months in Arizona
• 28-year-old female
• Inflammatory pain in thoracic and lumbar spine
• Fever and severe weight loss
• Spinal stiffness
• MRI of spine disclosed lesions in vertebral bodies
• Spinal tuberculosis suspected
• Positive diagnosis on day 4 of *Coccidioides immitis*
Case Report 2

- 58 year old Dutch male
- Immunocompetent
- Presented non productive coughing, fever, vomiting, and loss of appetite
- Medical history revealed mitral valve prolapse and atrial fibrillation
Case Report 2 (cont.)

• A chest x-ray, computer tomography and supraclavicular lymph node biopsy performed
• Generally, healthy persons recover spontaneously
• Immunocompromised patients need to continue with regular clinical visits
Question #1

• What are the two life cycle phases of *Coccidioides immitis* called?
  – A. Mycelial Arthrospore and Spherule Exospore
  – B. Mycelial Arthrospore and Spherule Endospore
  – C. Vegetative hyphae and Spherule Endospore
  – D. Vegetative hyphae and Spherule Exospore
Question #2

- All are risk factors of *Coccidioides* except:
  - A. Endemic regions with recent to natural disasters
  - B. Laboratory work with fungus
  - C. Animals
  - D. Activities with exposure to dust and soil
Question #3

• Which person is least likely to experience disseminated Coccidioidomycosis?
  – A. Kidney transplant recipient
  – B. Leukemia patient
  – C. Patient with congestive heart failure
  – D. AIDS patient
Question #4

• Which of the following is not used to diagnose Coccidioidomycosis?
  – A. Imaging studies
  – B. Skin test
  – C. Blood test
  – D. Sputum sample
Question #5

• Which of the following stains is *not* used to visualize Coccidioidomycosis?
  – A. PAS stain
  – B. KOH smear
  – C. Silver stain
  – D. India ink
References


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