Lungs infected with histoplasmosis

HISTOPLASMOSIS
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HISTOPLASMOSIS
Also known as Cave Disease, Darlings Disease, Ohio Valley Disease, Spelunker’s Lung, Reticuloendothelial cytomyicosis
Etiologic agent is histoplasma
- A fungus, typically Histoplasma Capsulatum, of the few varieties
  - H. Duboisii, alternate type which more commonly affects skin and bones compared to lungs

HISTOPLASMOSIS CLASSIFICATION
- Kingdom: Fungi
- Phylum: Ascomycota
  - Sub-phylum: Ascomycotina
- Class: Ascomycetes
- Order: Onygenales
- Family: Onygenaceae
- Genus: Ajellomyces (Histoplasma)

HISTOPLASMOSIS HISTORY
- Samuel Darling discovered as fungal infection in 1905
- Found that cell body was enclosed in a capsule
- In history, was mistaken oftentimes for tuberculosis
  - Difference is that histoplasmosis is fungi

HISTOPLASMOSIS WORLDWIDE DISTRIBUTION
- USA
  - Prevalent in Midwest and central areas, including the Ohio River & Mississippi valleys
  - Central & South Americas
  - Eastern & Southern Africa (H. Duboisii prevalent)
  - Australia
  - Eastern Asia (especially India & Malaysia)
  - Very RARE in Europe
- Found in poultry, house litter, caves, areas harboring bats, birds

HISTOPLASMA LIFE CYCLE
- Dimorphic endemic fungus
- Grows in mold form at 25 degrees Celsius and in yeast form at 37 degrees Celsius
  - Unicellular yeast form occurs at this temperature in mammals
Both sexual and asexual

Sexual Phase:
- Mold reproduces as conidia (microconidia) or mycelial fragments that become airborne when infected soil is disturbed

Asexual Phase:
- Yeast form that lives and replicates inside infected macrophages

Fungus grows in soil/material contaminated with bat/bird droppings
- Spores can become airborne when soil is disturbed
  - Spores then breathed in and may reach lung alveoli
  - In most cases, macrophages kill the yeast, however, the more yeast present, the more likely symptoms will develop

More frequent with the immunosuppressed
- AIDS, Cancers
- Can affect anyone in area where present
- NOT transmitted person to person

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Most prevalent in lungs
- Can spread to other parts of body
  - OHS (ocular histoplasmosis syndrome)
    - Leading cause of vision loss in ages 20-40
  - Spores can travel to blood vessels that supply retina causing CNV (choroidal neovascularization)

Mostly no apparent ill effects
- About 90% of all histoplasmosis infections are asymptomatic, meaning they produce no symptoms, or signs
  - Of the 10% with symptoms, about 5-7% recover completely
- When symptoms are symptomatic, they appear about 3-17 days after exposure
**Diagnosis**

- Definite diagnosis can be difficult
- Cultures of blood, tissue can be tested for growth
- Serology tests, and stains are often used among some more rare tests:
  - Complete blood count
  - Chest x-ray
  - CT scan
  - Alkaline Phosphate levels

**Prevention**

- Avoid areas of risk
- Can consult NIOSH/NCID document before working at place of risk
- People living in Ohio River valley are most likely exposed to histoplasma no matter what due to the fungus in dust in the air
- No vaccine available

**Research Study**

- During a 1997–2007 study period, 3436 patients received a solid organ transplant
- 38 patients were identified as having post-transplantation histoplasmosis
- 9 were excluded because the cases were clinical.
- 14 patients developed histoplasmosis after transplantation.
- 1 had histoplasmosis before receiving the transplant.
- The remaining 14 showed histological evidence of histoplasmosis in the recipient or donor tissue, which was encountered unexpectedly at the time of transplantation.

**Table 1. Attack and Incidence Rates of Histoplasmosis at the Cleveland Clinic, by Type of Organ Transplanted, 1997–2007**

<table>
<thead>
<tr>
<th>Type of Organ Transplanted</th>
<th>No. of SOT recipients</th>
<th>No. of patients with active histoplasmosis</th>
<th>Attack rate, cases per 1000 transplantations (95% CI)</th>
<th>Follow-up, person-years</th>
<th>Incidence rate, cases per 1000 person-years (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart</td>
<td>829</td>
<td>5</td>
<td>6.0 (2.0–14.0)</td>
<td>4073</td>
<td>1.2 (0.4–2.9)</td>
</tr>
<tr>
<td>Lung</td>
<td>499</td>
<td>3</td>
<td>6.0 (1.2–17.5)</td>
<td>1505</td>
<td>2 (0.4–5.8)</td>
</tr>
<tr>
<td>Kidney</td>
<td>1222</td>
<td>3</td>
<td>2.5 (0.5–7.2)</td>
<td>4985</td>
<td>0.6 (0.1–1.8)</td>
</tr>
<tr>
<td>Liver</td>
<td>746</td>
<td>1</td>
<td>1.3 (0–7.4)</td>
<td>2579</td>
<td>0.4 (0.0–2.2)</td>
</tr>
<tr>
<td>Pancreas</td>
<td>38</td>
<td>1</td>
<td>26.3 (0.7–138.1)</td>
<td>93</td>
<td>10.7 (0.3–59.9)</td>
</tr>
<tr>
<td>Kidney-pancreas</td>
<td>102</td>
<td>1</td>
<td>9.8 (0.2–49.6)</td>
<td>389</td>
<td>2.6 (0.0–14.3)</td>
</tr>
<tr>
<td>All</td>
<td>3436</td>
<td>14</td>
<td>4.1 (2.2–6.8)</td>
<td>13624</td>
<td>1.0 (0.6–1.7)</td>
</tr>
</tbody>
</table>

NOTE. Patients were classified according to the first solid organ transplant (SOT) received. CI, confidence interval.

**Research Study Treatment**

- Amphotericin B was given to 11 of the 14 patients who received an SOT.
- 9 of these 11 were switched to itraconazole.
- The other 2 were switched to voriconazole, as a result of physician preference.
- 2 patients with milder cases were treated with itraconazole only.
- The last patient was treated with itraconazole but was switched to voriconazole for a short time due to kidney problems.
RESEARCH STUDY (CONCLUSION)

- Post-transplant Histoplasmosis is rare.
- Occurring in only 1 case/1000 transplant-patients a year, even in endemic areas.
- The prognosis of the disease is good but it requires protective therapy.
- Patients with a latent infection did not develop active histoplasmosis when antifungal prophylaxis was used.

CASE STUDY 1

- A 33-year-old housewife, resident of Sirisi, Karnataka.
- HIV Positive.
- Developed multiple papular eruptions over the face, neck and abdomen.
- Skin biopsy taken from the lesion over the back revealed small round-to-oval organisms with a clear space were seen inside the macrophages.
- H. capsulatum was the causative agent.

CASE STUDY 1 (CONT)

- Started on antiretroviral therapy with zidovudine, lamivudine and efavirenz and oral fluconazole 150 mg daily for 3 weeks.
- The lesions healed completely in 3 weeks.
- Within 1 month profuse skin and oral lesions of the same type returned.
- The patient was switched to Amphotericin-B and the lesions were resolved.

REFERENCES

- Davis, Charles. "Histoplasmosis Causes, Symptoms, Treatment, Prevention and Prognosis by MedicineNet.com."