A 33 Year Old Man with Hemoptysis

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CPC considerations

Clinical Presentation

Clues from Travel History

Clues from Exposure History

Physical Exam, Laboratory and Radiographic clues

Differential Diagnosis and Best Diagnostic Guess

Applause and Respect

OR

Ridicule and Public Humiliation
Summary of Clinical Presentation and Symptoms

• 33 year old physician
• Recent PPD conversion
• On INH prophylaxis for approximately 5 weeks
• Acute onset hemoptysis
  – Absence of fevers, chills, weight loss or changes in bowel and urinary habits
Summary of Clinical Presentation and Symptoms

• Physical Exam-unremarkable

• Laboratory
  – Normal CBC and differential
  – Normal Chemistry pattern

• Radiology:
  – CT scan revealed a 4cm left lower lobe infiltrate with a central cyst and a more lateral left lower lobe alveolar infiltrate
Before looking for an exotic illness, what about *M. tuberculosis* as a diagnostic consideration?
M. tuberculosis pulmonary disease

• Important facts about primary or reactivation TB
  – Almost all patients are ill with some symptoms
    • Anorexia, fatigue, productive cough, night sweats, fever, weight loss.
  – Sputum is typically blood tinged
  – Radiographs
    • Infiltrates most common in the upper lobes and manifest as cavitations
M. tuberculosis pulmonary disease

• CPC man was asymptomatic until the acute onset hemoptysis
• No constitutional symptoms were reported
• Primary or reactivation TB would be unusual given ongoing INH prophylaxis
• Radiographic manifestations were not in the upper lobes and were cystic in nature
In Infectious Diseases, an exposure history is of paramount importance.
The Great Outdoors
Dining
Paradise
Epidemiologic Risk Factors, Travel and Exposure History

- Traveled to Thailand for 3 months in 2003
  - No contact with animals
  - No swimming in freshwater (lakes, streams)
  - Some mosquito bites, no flea or tick bites
  - No history of extensive barefoot walking
  - Drank bottled water exclusively
  - Consumed many seafood dishes
    - Reported a lot of shellfish consumption
      - Many dishes contained food with raw or undercooked shellfish
Shellfish
Shellfish Associated Illnesses

• Not all inclusive
  – Hepatitis A
  – Norwalk virus
  – *Vibrio parahaemolyticus*, and *Vibrio vulnificus*
  – Shellfish poisoning syndromes
    • Paralytic shellfish poisoning (PSP)
    • Neurologic shellfish poisoning (NSP)
    • Diarrheal shellfish poisoning (DSP)
    • Amnestic shellfish poisoning (ASP)
  – Trematodes:
    • *Paragonimiasis*
Shellfish Cuisine-Examples

• China
  – Wine-soaked freshwater crab, crayfish curd, raw crab juice and crab jam

• Thailand
  – Raw freshwater shrimp salad
  – Crab sauce

• Korea
  – Raw crab in soy sauce

• Philippines
  – Roasted or raw crabs
  – Crab juice seasoning
Mosquito Borne Illnesses

• (Not all inclusive)
  – Western equine encephalitis
  – Eastern equine encephalitis
  – St. Louis encephalitis
  – California virus encephalitis
  – West Nile Virus
  – Dengue fever
  – Venezuelan encephalitis
  – Tularemia
  – Malaria
  – Yellow fever
  – Dirofilariasis
  – *Wucheria bancrofti*-filariasis
Is the exposure history in any way related to the presence of pulmonary pathology presented in this case?
Radiographic Clues
Radiographic Clues

Chest CT revealed normal lung parenchyma except for a 4 cm left lower lobe alveolar infiltrate with a central cyst and a more lateral left lower lobe alveolar infiltrate.
Differential Diagnosis-Parasitic Diseases of the Respiratory Tract

- Hydatid disease
- *Paragonimiasis*
- *Schistosomiasis*
- *Strongyloidi*asis
- *Ascaris* and hookworm infection
- *Dirofilaria*sis
- *Toxocarai*asis
- Tropical pulmonary eosinophilia- *Wucheria bancrofti* and *Brugyii malayi*
<table>
<thead>
<tr>
<th>Parasite/Disease</th>
<th>Geographic Distribution</th>
<th>Transmission</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Echinococcosus</strong></td>
<td>worldwide</td>
<td>Ingestion of contaminated food or fluids</td>
<td>Chest pain, cough, hemoptysis, cystic lesions</td>
</tr>
<tr>
<td><strong>Paragonimiasis</strong></td>
<td>South-east Asia, South America, Africa</td>
<td>Ingestion of raw or undercooked crabs, shellfish</td>
<td>Asymptomatic, fever, cough, hemoptysis, nodular, cystic and pleural lesions</td>
</tr>
<tr>
<td><strong>Strongyloidiasis</strong></td>
<td>Tropical &amp; sub-tropical areas</td>
<td>Skin penetration in soil</td>
<td>Loeffler like syndrome, hyperinfection syndrome</td>
</tr>
<tr>
<td><strong>Ascariasis</strong></td>
<td>Africa, Asia, Central and South America</td>
<td>Ingestion of contaminated food or fluids</td>
<td>Loeffler like syndrome</td>
</tr>
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<td>Parasite/Disease</td>
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<tr>
<td><strong>Ancylostoma Duodenale</strong></td>
<td>Tropical &amp; sub-tropical areas</td>
<td>Skin penetration in soil and oral contamination</td>
<td>Loeffler like syndrome</td>
</tr>
<tr>
<td><strong>Dirofilaria immitis</strong></td>
<td>Tropical &amp; sub-tropical areas</td>
<td>Mosquito bites</td>
<td>Asymptomatic, Coin lesion on chest x-ray</td>
</tr>
<tr>
<td><strong>Wucheria bancrofti</strong></td>
<td>Tropical &amp; sub-tropical areas</td>
<td>Mosquito bites</td>
<td>Eosinophilic pneumonia, wheezing, paroxysmal cough</td>
</tr>
<tr>
<td><strong>Toxocariasis</strong></td>
<td>Worldwide</td>
<td>Oral (ingestion of soil containing eggs)</td>
<td>Eosinophilic pneumonia, wheezing</td>
</tr>
</tbody>
</table>
Based on Exposure History

- CPC Man
- Dirofilariasis
- Parasitic Pulmonary Disease
- Paragonimiasis

Diseases mentioned in the context of exposure history include:

- Dirofilariasis
- Paragonimiasis
Dirofilariaiasis
Dirofilariasis

• The zoonotic filariae, *Dirofilaria immitis* and *Dirofilaria repens*, have become increasingly recognized worldwide as inadvertent human pathogens
• Human disease tends to be independent of dog ownership.
Dirofilariasis

www.cvm.okstate.edu/.../ 3HeartwormLife.htm
Dirofilariaisis

• Seroprevalence of *Dirofilariaisis* in dogs
  – Spain: 33%
  – Greece: 5-11%
  – Italy: 29%
  – Australia: 3%
  – Sri Lanka: 30-60%
  – USA: 0.3% Colorado, 40% in Florida and South Carolina

*Dirofilariaisis* is ubiquitous
Dirofilaria - Human Disease

• Subcutaneous Nodular Disease
  – The most commonly reported manifestation of human dirofilaria is caused by *D. repens*

• Human Pulmonary Disease
  – *D.imitis or D. repens*
  – Has been described on all continents
  – To date, there have been no reported human fatalities secondary to *Dirofilaria*
Dirofilaria- Human Disease

- Humans are accidental and dead-end hosts of *Dirofilariaae*
  - Adult worms do not reach maturity in the heart or skin.
  - Most infective larvae perish in humans
    - Infected individuals usually are not microfilaremic
Dirofilariasis-Cutaneous Disease

*Dirofilaria repens* cutaneous disease

- Superficial infections (subcutaneous or subconjunctival lesions)
- Distribution:
  - Upper body site infection (76%)
  - Lower body site infection (24%)
- Upper body site:
  - The head (46%) which
    - Conjunctiva (31%) and face (15%)
  - Chest wall and/or breast (15%)
  - Upper limbs (12%)
  - Neck (3%).
Dirofilariaisis - Pulmonary Disease

- Incidental finding of a pulmonary lesion on chest radiograph.
- Well-circumscribed peripheral coin lesion or nodule.
- Solitary nodules in 90% of cases
- Transitory pulmonary nodules and calcified pulmonary granulomas (7%) have been described.
- Lesions
  - Subpleural (68%)
  - Right lung (76%)

http://www.itg.be/itg/DistanceLearning/LectureNotesVandenEndenE/imagehtml/ppages/CD_1027_097c.htm
Dirofilariasis - Pulmonary Disease

- Well-circumscribed peripheral coin lesion or nodule.
- Solitary nodules in 90% of cases
- Most cases are asymptomatic
- When present, symptoms include localized retrosternal chest pain, cough, hemoptysis, wheezing, low-grade fever, chills, and malaise.

http://www.conganat.org/7congreso/imagenes_trabajos/319-Figura%201%20TAC%20dirofilaria.jpg
**Dirofilariasis**

- **Laboratory Diagnosis**
  - Eosinophilia
    - Only 20% of cases of Human Pulmonary Disease
  - *Dirofilariae* serology (Elisa)
    - 30% rate of false positivity; cross reactivity with other nematode antigens
  - Surgical pathology or bronchoscopy samples
    - Histopathologic diagnosis
    - Polymerase chain reaction (PCR) amplification of genomic DNA extracted from single worms for the diagnosis of *D.immitis* and *D.repens* infection
Oriental Lung Fluke
Paragonimiasis

Causal Agent:
More than 30 species of trematodes (flukes) of the genus *Paragonimus* have been reported.

10 species reported to infect humans, the most common is *P. westermani*, the oriental lung fluke.
Paragonimiasis

http://www.dpd.cdc.gov/dpdx/HTML/Paragonimiasis.htm
Paragonimiasis

Secondary Host: Chinese mitten crab

Final Host: Humans and other mammals

Primary Host: freshwater snail

Parasite: Oriental lung fluke

http://www.seerecht.org/wegelein/course/group/graphics/fluke.gif
Paragonimiasis

• Acute phase: 2-15 days
  – Invasion and migration:
    • Diarrhea, abdominal pain, fever, cough, urticaria, hepatosplenomegaly, and pulmonary abnormalities
    • Most cases are asymptomatic
    • Eosinophilia is uncommon

• Chronic phase: 5-10 years
  • Pulmonary manifestations include cough, expectoration of discolored sputum, hemoptysis, and chest radiographic abnormalities.
  • Extrapulmonary locations of the adult worms result in more severe manifestations, especially when the brain is involved

• Humans can continually re-infect themselves by ingesting raw or poorly cooked crabs or crayfish containing *P. westermani*
Paragonimiasis—Pulmonary Pathophysiology

- Fluke penetration into the lung:
  - Hemorrhagic and exudative pneumonia occurs
  - Presents as ill-defined patchy airspace consolidation (poorly-defined cotton wool opacities) on radiographs.

- Concurrently, 2 to 4-mm thick and 2 to 7-cm long band-like opacities abutting the pleura seen
  - Represents worm migration tracts or peripheral atelectasis.
Paragonimiasis—Radiographic Manifestations

- Worm migration tracts
- Patchy migrating pneumonia
- Atalectasis
- Nodular densities
- Cystic lesions
Paragonimiasis—Radiographic Manifestations

Migrating larvae:
Fluffy "cotton wool" densities in the medial aspect of the right lung base and also near the left costophrenic angle, represent areas of exudative pneumonitis.

tmcr.usuhs.mil/tmcr/chapter22/radiological01.htm
Paragonimiasis - Radiographic Manifestations

- Fluffy, cotton wool densities in the right lung base and left suprahilar area produced by the migrating larvae which have penetrated the diaphragm and pleura in the first stage.

- Small nodular densities in the left midlung and areas of fibrosis and tiny calcifications in the right lower lung

- Humans can continually reinfect themselves by ingesting raw or poorly cooked crabs or crayfish containing *P. westermani*

- Lesions can appear in different stages of the lungs

[tmcr.usuhs.mil/tmcr/chapter22/radiological01.htm](tmcr.usuhs.mil/tmcr/chapter22/radiological01.htm)
Paragonimiasis-Radiographic Manifestations

- High-resolution CT scan of a 61-year-old man with paragonimiasis shows a linear band-like area of increased attenuation (arrow) abutting the major pleural fissure.

- Worm migration tract

tmcr.usuhs.mil/tmcr/chapter22/radiological01.htm
**Paragonimiasis—Diagnosis**

- Diagnosis is based on microscopic demonstration of eggs in stool, sputum or BAL fluid
  - Eggs are not present until 2 to 3 months after infection
- Transthoracic or open lung biopsy
  - Histopathologic diagnosis and species identification when an adult or developing fluke is recovered
Paragonimiasis: Diagnosis

Egg of Paragonimus westermani.
• The average egg size is 85 µm by 53 µm (range: 68 to 118 µm by 39 to 67 µm).
• Yellow-brown color, ovoidal or elongate, with a thick shell, and often asymmetrical with one end slightly flattened.
• The eggs of P. westermani are excreted unembryonated.

http://www.dpd.cdc.gov/dpdx/HTML/Paragonimiasis.htm
Paragonimiasis: Diagnosis

- The immunoblot (IB) assay of *P. westermani* since 1988.
- Reported Sensitivity of 96% in patients with parasitologically confirmed *P. westermani* infection.
- Reported Specificity of >99%; of 210 serum specimens from patients with other parasitic and non-parasitic infections.
- Antibody levels detected by EIA and IB decline after therapeutic cure.
- Most published literature deals with pulmonary paragonimiasis due to *P. westermani*.
- Cross-reactivity between species does occur.

Hemoptysis; acute onset, without other pulmonary or constitutional symptoms

1 ½ years later

Dr. Bearman’s Diagnosis:

• *Paragonimiasis*

• Diagnostic Test Performed:
  - Analysis of BAL fluid or Needle guided Biopsy
  - Stool for O&P
  - ELISA-Immunoglobulin titers
The End