Parasitic Lung Diseases

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Pulmonary paragonimiasis has been reported from the following geographical areas (autochthonous cases), except:

A. Southeast Asia
B. China
C. North America
D. Africa
E. This question is tricky because autochthonous cases have been reported from all the above areas

Parasitic Lung Infections

Outline

- case presentation
- when to suspect parasitic lung diseases?
- immunocompetent vs. immunocompromised patients
- clinical and radiological presentation of common parasites affecting the lung
- brief mention of treatment and prevention
- parasitic lung infections associated with eosinophilia
A previously healthy 26 yo woman was admitted to her local hospital with the working Dx of community acquired pneumonia

- 2-wk hx of cough, fevers, night sweats, fatigue, malaise, and vomiting
- hospital discharge on levofloxacin
- returned due to persistence of symptoms
- eosinophil count = 2000cells/mm3 (20% of WBC)
- transbronchial biopsy revealed an eosinophilic inflammatory infiltrate
- BAL revealed eosinophilia as well
- BAL cultures for bacteria, TB, and fungi: negative

A previously healthy 26 yo woman with a focal consolidation in the superior segment of the left lower lobe, a left pleural effusion and significant eosinophilia

A presumed diagnosis of eosinophilic pneumonia was made and methylprednisolone initiated

- patient's symptoms improved with the use of steroids
- however, her fevers, chills, night sweats, and malaise returned when use of steroids was tapered
- she also developed a 0.5-cm nodular lesion inferior to her left lower lip. A needle biopsy demonstrated an inflammatory infiltrate with conspicuous eosinophils. The lesion grew in size to 1.5 cm and migrated to her left cheek
Patient referred to teaching hospital for pneumonia, significant eosinophilia, and migrating skin lesions

- upon further questioning, the patient revealed that she had been on a “float trip” on a tributary of the Meramec River in south eastern Missouri—4 weeks before the onset of her symptoms
- she also stated that she had eaten 2 uncooked crawfish from the river while intoxicated with alcohol
- two weeks after returning from the float trip, she developed a self-limited diarrheal illness. She later experienced fatigue, malaise, cough, fevers, night sweats, and vomiting.

An ELISA test was positive for Paragonimus species at 1:32

Patient received a diagnosis of pulmonary and cutaneous paragonimiasis and was treated with praziquantel 75mg/kg in 3 divided doses for 2 days

- her systemic symptoms resolved within 48 hrs of initiating therapy, and the left cheek mass resolved within 7 days of Rx
- methylprednisolone was tapered and discontinued
- one month after treatment, she denied having fever, night sweats, cough, or malaise
- two other patients received the confirmed or presumed diagnosis of paragonimiasis and also had the hx of ingestion of raw crawfish or crayfish while they (the patients) were intoxicated with alcohol

When to suspect parasitic lung diseases?

- born or lived in endemic areas (however, pay attention to possibility of autochthonous cases)
- significant peripheral blood eosinophilia
- unexplained and worsening cases of community acquired pneumonia
- certain radiological presentations (e.g. cystic lesions, fleeting infiltrates)

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Vijayan VK
Current Opinion in Pulmonary Medicine; 2009; 15: 274-82

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Pulmonary amoebiasis

- trophozoites can cross the intestinal mucosa and through the bloodstream reach liver, brain and lungs
- however, the most common route to the lungs is by extension of a right lobe liver abscess to the pulmonary tissue (through the diaphragm)
- fever, RUQ/chest pain, cough and hemoptysis
- "anchovy sauce-like" pus

Radiological findings pleuro-pulmonary amoebiasis include elevated hemidiaphragm, tender hepatomegaly, pleural effusion and basal pulmonary involvement

Pulmonary amoebiasis can be diagnosed by the presence of trophozoites in the sputum or pleural fluid

- stool tests are not confirmatory (E. dispar or E. moshkovskii)
- serum antigen or antibody detection (IHA) are highly sensitive
- real-time PCR is probably the best test but it is still technically challenging
- metronidazole or tinidazole (outside the US secnidazole, and ornidazole)
- paromomycin or the second-line agent diloxanide furoate to cure luminal infection
Pneumonia is a common manifestation of toxoplasmosis in IC patients and has been reported in immunocompetent patients in France, before the HAART era, 5% of AIDS patients with a PCP-like CXR had proven pulmonary toxoplasmosis pneumonia, with or without fever, is also frequently reported as a manifestation of toxoplasmosis in H SCT and liver transplant patients (brain abscesses appear to be less frequently present in non-AIDS patients).

Cough, dyspnea, hypoxia, and diffuse bilateral or localized infiltrates

Delhaes L et al. BMT  2009; July 3 Epub ahead of print

Pulmonary toxoplasmosis in a 41yo man who presented to an emergency room with life-threatening pneumonia presented to a Brazilian hospital with an 8-day history of fever, myalgia, and headache followed by 4 days of nausea and vomiting (HIV negative)

Fever (temperature, 40 C), jaundice, hepatosplenomegaly, and tachycardia (heartrate,115/min) but no lymph node enlargement

AST: 269; ALT: 312; total bili: 2.32; LDH: 755

Thirty-six hours after admission to the hospital, he developed respiratory insufficiency with bilateral pulmonary reticular opacities suggestive of interstitial infiltrates.

9/24/05 on admission 9/28/05 10/26/05 after anti-toxo Rx isolation of T. gongii from patient’s blood
Patient was treated with sulfadiazine, pyrimethamine, corticosteroids, and folinic acid.

Serologic testing revealed the presence of *T. gondii*-specific IgM antibodies by ELISA.

He exhibited a marked improvement in his clinical, radiological, and laboratory findings after the fourth day of anti-toxoplasma therapy and he was discharged from the hospital 12 days after admission.

PCR in CSF and isolation studies in peripheral blood were positive for *Toxoplasma gondii*.

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Community outbreak of acute toxoplasmosis in immunocompetent patients:
- Unusually severe clinical presentation in 11 otherwise normal individuals
- 8 had severe disseminated disease (including pneumonia and hepatitis) that resulted in three deaths: one adult, one newborn, and one fetus
- Genotype analysis with 8 microsatellite markers revealed that only one strain was responsible for at least 5 of the 11 cases.

Demen M et al. Clin Infect Dis 2007;45: e88-95

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**Laboratory Diagnosis of Pulmonary Toxoplasmosis**

Serologies (IgG, IgM*)

PCR in BAL or peripheral blood (or any body fluid as clinically indicated)

Histological examination with Wright Giemsa stain of sputum or BAL

Isolation of the parasite from any body fluid or tissue

*Positive IgM test results should undergo confirmatory testing at a reference laboratory (e.g., in the United States, at the Palo Alto Medical Foundation Toxoplasma Serology Laboratory [PAMF-TSL]: Palo Alto, CA; http://www.pamf.org/serology/; telephone number (650) 853-4828; e-mail, toxolab@pamf.org).*
Treatment of Pulmonary Toxoplasmosis

- pyrimethamine/sulfadiazine/folinic acid
- trimethoprim/sulfamethoxazole
- pyrimethamine/clindamycin/folinic acid
- pyrimethamine/atovaquone/folinic acid

Pulmonary echinococcosis or hydatidosis

*Echinococcus granulosus and E. multilocularis*

- cough, fever, dyspnea, chest pain
- compression of adjacent tissue by the cysts.
- rupture of the cysts into a bronchus may result in hemoptysis and expectoration of cystic fluid containing parasite membrane and can cause anaphylactic shock, respiratory distress, asthma-like symptoms, persistent pneumonia and sepsis
- rupture into the pleural space results in pneumothorax, pleural effusion and empyema

Radiological findings include solitary or multiple round opacities mimicking lung tumors, pneumothorax, pleural effusion

Antibody detection remains as the only supportive diagnostic method. Identification of Protoscoleces in tissue or cystic fluid establishes the diagnosis.

Treatment is primarily surgical.
Medical treatment includes albendazole +/- praziquantel.

Strongyloides stercoralis has worldwide distribution but more common in South America, South-East Asia, sub-Saharan Africa, and the Appalachian region of the United States.

Strongyloides infection is sustained over time in a given host by a small, stable number of intestinal adult worms although these die after a finite lifespan, autoinfection ensures the constant production of new worms perpetuating the cycle even in the absence of re-infection.

HTLV-infection or corticosteroid use are major risk factors for dissemination and pulmonary involvement.

Pulmonary symptoms include cough, shortness of breath, wheezing and hemoptysis in patients with disseminated strongyloidiasis. Gram negative septicemia, pneumonia, and meningitis can occur.

ARDS often develops.
Eosinophilia is often absent during hyperinfection.

Strongyloides-specific serological tests (CDC) the parasite can be visualized in respiratory secretions.
Respiratory secretions often contain the parasite Strongyloides. Bronchoscopic biopsy in a patient with Strongyloides hyperinfection syndrome. Courtesy Chandra Krishnan, MD, Stanford University Department of Pathology.

Sputum sample BAL sample showing filariform larvae. Courtesy Stanford University Microbiology Laboratory.

Pneumonitis is common, with cough, respiratory failure, and diffuse interstitial infiltrates or consolidation on radiographs. CXR and CT in a Stanford patient with Strongyloides hyperinfection syndrome. Ivermectin is preferred for hyperinfection/disseminated strongyloidiasis. It should be administered daily until symptoms have resolved and larvae have not been detected for at least two weeks.

Table 1: Infectious causes of pulmonary eosinophilia

<table>
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<tr>
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<tr>
<td>a. Necatora</td>
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<td>b. Pneumocystis carinii</td>
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<tr>
<td>c. Inhalation of other parasites</td>
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<td>a. Mycobacterial pneumonia</td>
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<td>b. Nontuberculous mycobacterial pneumonia</td>
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<td>a. Aspergillus</td>
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<td>b. Curvularia</td>
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Noninfectious causes of pulmonary eosinophilia

- bronchial asthma
- acute eosinophilic pneumonia
- chronic eosinophilic pneumonia
- idiopathic hyper-eosinophilic syndrome
- cryptogenic pulmonary fibrosis
- Wegener's granulomatosis
- lymphomatoid granulomatosis
- eosinophilic granuloma of the lung
- Churg-Strauss syndrome
- drug hypersensitivity reactions

Tropical Pulmonary Eosinophilia (TPE)

- Syndrome that results from an immunologic hyper-responsiveness to filarial parasites, *Wuchereria bancrofti* and *Brugia malayi*.

- Characterized by cough, dyspnea, and nocturnal wheezing, diffuse reticulonodular infiltrates and marked peripheral blood eosinophilia.

- Patient travelling from a filarial endemic region presenting with "asthma-like" symptoms.

- Sputum is usually scanty, viscous and mucoid, often shows clumps of eosinophils, Charcot-Leyden crystals are rarely observed.

- Hallmark of TPE is leukocytosis with an absolute eosinophil count of usually more than 3000 cells/mm³ (may range from 5000 to 80000).

Loeffler's syndrome

- Unilateral or bilateral, transient, migratory, nonsegmental opacities of various sizes in the setting of parasitic infections.

- Usually described in patients with pulmonary Ascaris infection.

- Leucocytosis, particularly eosinophilia, is an important laboratory finding.

- Larvae can sometimes be demonstrated in respiratory or gastric secretion.
Pulmonary paragonimiasis has been reported from the following geographical areas (autochthonous cases), except:

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