

Pulmonary Infectious Diseases: Review Questions

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QUESTIONS

Choose the single best answer for each question.

Questions 1 and 2 refer to the following case study.

A nonsmoking 26-year-old woman sees a pulmonologist for evaluation of a 5-month history of persistent cough, wheezing, nasal congestion, and weight loss. She reports no reflux. She emigrated from Guyana 5 years ago and had no significant medical history in her native country. She took no medications until recently when she was treated with antibiotics, systemic and inhaled corticosteroids, and albuterol in an emergency department (ED); despite treatment, symptoms persisted, and a leukotriene antagonist was added, again with little relief of symptoms. Laboratory studies at that time showed leukocytosis (leukocyte count, $28 \times 10^3/\text{mm}^3$) with a differential of $16.3 \times 10^3/\text{mm}^3$ (58%) eosinophils; erythrocyte sedimentation rate was 37 mm/h. Results of serum chemistries were normal, and an antinuclear antigen assay was negative. Results of pulmonary function tests were as follows: forced vital capacity (FVC), 61%; forced expiratory volume in 1 second (FEV_1), 65% (with a significant bronchodilator response); FEV_1/FVC , 85; total lung capacity, 61%; functional residual capacity, 50%; residual volume, 54%; diffusing capacity of the lung for carbon monoxide, 54%. Arterial blood gas analysis revealed a pH of 7.41, PCO_2 of 36 mm Hg, PO_2 of 102 mm Hg, oxygen saturation of 98% on room air, and an alveolar arterial gradient of 5 mm Hg. Chest radiography revealed a fine interstitial infiltrate, and a high resolution computed tomography scan of the chest revealed a fine nodular pattern in both middle and lower lung fields.

1. Which of the following diagnostic steps is most appropriate to assess the patient's condition?

- (A) Measure serum IgG4 level
- (B) Perform bronchoscopy with bronchoalveolar lavage and transbronchial biopsy

- (C) Perform open lung biopsy
- (D) Test for *Aspergillus* precipitins
- (E) Test stool for ova and parasites

2. Administration of which of the following is the most appropriate treatment for this patient?

- (A) Amphotericin B
- (B) Diethylcarbamazine
- (C) Inhaled corticosteroids
- (D) Itraconazole
- (E) Systemic corticosteroids

Questions 3 and 4 refer to the following case study.

A 31-year-old woman from the Ivory Coast is admitted to the hospital because of a 3-month history of fever, chills, weight loss, and a productive cough. She came to the ED when her sputum became tinged with blood. Chest radiography reveals a left upper lobe infiltrate with a cavity. She is placed in respiratory isolation; sputum is collected and sent for analysis for acid-fast bacillus (AFB), along with blood for a CD4+ count and an HIV test. Results of the sputum sample test are positive for AFB, her CD4+ count is $68/\text{mm}^3$, and she is HIV-positive.

3. Which of the following is the most appropriate next step in this patient's treatment?

- (A) Start 4 antituberculous medications
- (B) Start 4 antituberculous medications after obtaining AFB sensitivity
- (C) Start 4 antituberculous medications plus anti-retroviral medications
- (D) Start highly active antiretroviral medications

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4. The triage nurse in the ED is concerned because she was significantly exposed to the patient while the patient had been coughing. Results of purified protein derivative (PPD) skin testing in the past have always been negative. Which of the following is the most appropriate next step for the pulmonologist to take?
- (A) Offer reassurance
 - (B) Perform a PPD skin test
 - (C) Perform a PPD skin test, and start preventive treatment if induration is greater than 5 mm
 - (D) Start 4 antituberculous medications
 - (E) Start preventive treatment

EXPLANATION OF ANSWERS

1. (A) Measure serum IgG4 level. The patient has eosinophilia out of proportion to her symptoms; it did not respond to standard therapy for asthma and should prompt consideration of an alternate diagnosis. The differential diagnosis is quite broad but should include Churg-Strauss syndrome, acute and chronic eosinophilic pneumonia, fungal infections, and tropical pulmonary eosinophilia (TPE). The patient was born in an area endemic for filariasis. TPE occurs in less than 1% of patients with filariasis, but it is common in India, Southeast Asia, the West Indies, Africa, and China.¹ It is the result of an immunologic reaction to the microfilariae liberated by gravid *Wuchereria bancrofti* and *Brugia malayi* parasites that become trapped in the circulation of the lung. A mosquito vector transmits the microfilariae; adult worms can live up to 10 years within lymph nodes liberating millions of microfilariae. Chest radiography usually reveals reticulonodular opacities, predominantly in the middle and lower lung zones (20% can be normal).² Computed tomographic scans are more sensitive in detecting abnormalities in this disease. Pulmonary function tests can reveal an obstructive ventilatory defect early in the disease and mixed ventilatory defects in the later stages with decreased diffusion. The diagnosis is established by history of residence in an endemic area, peripheral eosinophilia ($> 3 \times 10^3/\text{mm}^3$), elevated total serum IgE level, and elevated parasite-specific IgG4 level. Although the parasites can be found on biopsy specimens, biopsy is rarely necessary to establish a diagnosis. If left untreated, TPE may progress to fibrotic lung disease. Although fiber optic bronchoscopy, bronchoalveolar lavage, transbronchial biopsy, and open lung biopsy can aid in the diagnosis of TPE, they are not necessary to make the diagnosis¹; they would be reasonable if results of the work-up for TPE were negative. Stool for ova and parasites are usually negative in TPE unless the patient is coinfecting with another parasite. Testing for *Aspergillus* precipitins would be useful to diagnose an *Aspergillus* infection, but it would not diagnose TPE.³
2. (B) Diethylcarbamazine. The patient has TPE, which is a parasitic disease treated with diethylcarbamazine; a favorable response is often considered the final criterion in diagnosis.¹ Corticosteroids and antifungal agents would not be an effective cure for this disease.^{1–3}
3. (A) Start 4 antituberculous medications. The patient has a history and supporting data consistent with active pulmonary tuberculosis (TB) and HIV infection, both of which must be treated. The concomitant treatment of both diseases has produced paradoxical reactions; by delaying highly active antiretroviral therapy (HAART) for at least 2 months, these reactions can be avoided while simultaneously avoiding the drug interactions associated with the rifamycins, which are used to treat TB, and HAART.⁴
4. (E) Start preventive treatment. Patients exposed to TB may have negative results on purified protein derivative (PPD) skin testing initially; however, they should be retested after 12 weeks. In the meantime, they should receive preventive treatment.⁵ If the results of the PPD test remain negative, preventive therapy may be discontinued. Standard preventive therapy consists of isoniazid given daily for 9 months.

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