Rhodococcus equi Pneumonia*

An Unusual Early Manifestation of the Acquired Immunodeficiency Syndrome (AIDS)

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Infection with Rhodococcus equi has been reported as an occasional cause of cavitary pneumonia in severely immunocompromised patients, including those with the acquired immunodeficiency syndrome (AIDS). We report two cases of R equi pneumonia presenting in one month in patients infected with human immunodeficiency virus (HIV) who had not previously had an opportunistic infection. The clinical and radiographic manifestations of the disease are distinctive and should suggest the diagnosis. R equi pneumonia in a person with HIV infection should be considered diagnostic of AIDS. Recognition of this entity is important since antibiotic therapy is different from that conventionally used in pneumonias in AIDS patients and must be prolonged.

Rhodococcus equi is an aerobic Gram-positive weakly acid-fast nonmotile nonsaprophytic pleomorphic bacillus which has been identified as a source of cavitary pneumonia, pleural effusions, brain abscesses, and subcutaneous nodules in immunocompromised hosts. Initially recognized as a pathogen in animals, Rhodococcus equi (formerly known as Corynebacterium equi) was first reported as a human pathogen by Golub et al7 in 1967 in a patient with a lung abscess. In 1983, Van Etta et al8 summarized findings in the ten cases in the literature and added two of their own. Since then, four additional cases have been reported, two of which occurred in patients with the acquired immunodeficiency syndrome (AIDS).9,10 We report two additional cases of cavitary pneumonia with pleural effusion due to Rhodococcus equi presenting in one month to Parkland Memorial Hospital in patients infected with the human immunodeficiency virus (HIV). Recognition of this pathogen as a cause of cavitary pneumonia and/or pleural effusion in the growing population of patients with HIV-associated illness has important therapeutic implications regarding both choice and duration of antibiotic therapy. Because R equi very rarely infects normal hosts, we feel that this infection in patients positive for HIV should be regarded as sufficient for a diagnosis of AIDS.

CASE REPORTS

Case 1

A 29-year-old homosexual white man with a history of HIV infection presented to Parkland Memorial Hospital with a one-month history of fever, pleuritic chest pain, and cough productive of scant clear sputum not responsive to a course of trimethoprim-sulfamethoxazole and cefaclor. He gave an occupational history of industrial woodworking and ranch work with exposure to horses and a variety of livestock. On examination, he had a temperature of 36°C with a respiratory rate of 14/minute. Chest auscultation was significant for the presence of a pleural rub over the left anterior chest wall. Chest radiographs demonstrated a cavitating infiltrate in the superior segment of the lingula, with a small left pleural effusion. Thoracentesis yielded 20 ml of bloody fluid with white blood cell count 20,500 x 10⁹/L and red blood cell count 108,000 x 10⁹/L. Bronchoscopic examination revealed mild erythema of the entire bronchial tree, but no localized abnormalities. Transbronchial biopsy revealed fibrosis and mild acute and chronic inflammation consistent with organizing pneumonia. Biopsy specimens, as well as brushings and washings, were negative for acid-fast bacilli, fungi, and Pneumocystis. A blood culture was reported as growing a "diphtheroid" which was regarded as a contaminant.

He returned several days following discharge with recurrent left pleuritic chest pain and cough, now with a temperature of 38.5°C. His white blood cell count had risen to 19.1 x 10⁹/L. Chest radiographs showed enlargement of the left upper lobe infiltrate with a cavity containing an air-fluid level (Fig 1). The cultures of pleural fluid, bronchoscopic washings, and blood from the previous hospitalization, as well as blood and sputum from this hospitalization, all grew a Gram-positive aerobic bacillus identified as R equi. The isolates of R equi were very sensitive to erythromycin, gentamicin, and vancomycin, moderately sensitive to clindamycin and tetracycline, but resistant to ampicillin, cephalothin, and penicillin. Therapy with clindamycin alone had little effect, although the addition of erythromycin and later tetracycline resulted in clinical improvement for the next six months.

Case 2

A previously healthy 45-year-old homosexual white man first presented to another hospital with a four-day history of fever, chills, right pleuritic chest pain, and cough productive of gray blood-tinged sputum. Physical examination revealed a temperature of 40°C and respiratory rate of 28/minute. Rhonchi, egophony, and dullness were

FIGURE 1. Chest radiograph showing a cavitary left upper lobe infiltrate with an air-fluid level.

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noticed at the right base. His white blood cell count was 7.4 \times 10^9/L. His chest radiograph demonstrated a dense right lower lobe infiltrate. Sputum cultures and smears, blood cultures, pleural fluid cultures, bone marrow biopsy, open lung biopsy, and viral titers were negative, although HIV positivity was documented. After a two-month hospital course which included respiratory failure requiring intubation, mechanical ventilation, and therapy with multiple parenteral antibiotics, he defervesced and was discharged.

One month later, he returned to the same hospital with fevers, sweats, chest pain, and a cough productive of copious brownish-yellow sputum. Although the patient resided in a rural area, he denied handling livestock or horses. Chest radiograph showed a new right perihilar infiltrate in the superior segment of the right lower lobe (Fig 2). Gram-stain of sputum showed only mixed flora, but the acid-fast smear was positive for atypical cocco-bacillary forms. Therapy with oral tetracycline and then intravenous doxycycline was instituted, but he remained febrile with an increasing infiltrate. Blood and sputum cultures grew R equi sensitive to most antibiotics, including cephalothin, penicillin, ampicillin, vancomycin, erythromycin, tetracycline, and gentamicin. He responded to a course of intravenous penicillin and gentamicin and received two weeks of therapy with erythromycin thereafter.

One week after completion of erythromycin, the patient complained of increased dyspnea and cough productive of brownish-red sputum. He presented to Parkland Memorial Hospital the next day with temperature of 39°C and labored respirations at 40/min. Diffuse rhonchi were noted bilaterally with decreased breath sounds in the right mid-lung field. Chest radiographs revealed a large right lower lobe superior segment infiltrate with a cavity and an air-fluid level, as well as a right pleural effusion. Therapy with intravenous vancomycin and gentamicin were begun, but the patient deteriorated rapidly and died within one day. Blood cultures subsequently grew R equi that was now resistant to beta lactam antibiotics, including cephalothin, penicillin, and ampicillin. Postmortem examination revealed bilateral bronchopneumonia, extensive necrosis of the right lung parenchyma, and a large right empyema. Gram-positive acid-fast organisms morphologically consistent with R equi were present in histologic sections.

**Discussion**

The incidence of infection with R equi, although low, appears to be increased in patients with HIV infection. Our cases bring to four the number of reports of pulmonary disease due to R equi in patients with HIV-related illnesses. As our two patients illustrate, infection with this organism can be an early manifestation of immune dysfunction related to HIV. Although experience with R equi is limited, the characteristics of these four cases are remarkably similar and should suggest the diagnosis.

Both of the cases of R equi pneumonia previously reported in association with HIV infection had a left upper lobe cavitary infiltrate. One of these patients developed an empyema, and the other had associated pleural thickening. Our two cases also presented with cavitary infiltrates and pleural effusion. Therefore, all cases of R equi in these patients have had cavitary pneumonia with pleural disease. This presentation with a subacute illness with an upper lung field cavitary infiltrate and an associated pleural effusion at some time in the course is sufficiently unusual in AIDS that we think the possibility of infection with this organism should be considered in the differential diagnosis of such a patient. Although the location of the infiltrate might suggest tuberculosis, Pitchenik and colleagues observed that *Mycobacterium tuberculosis* rarely produced cavitation in AIDS patients.

In vitro and limited clinical data suggest that appropriate antibiotic treatment includes erythromycin, clindamycin, tetracycline, vancomycin, and aminoglycosides. It is reasonable to treat the patient parenterally with two drugs to which the organism is sensitive, followed by a prolonged course of two oral agents until the infiltrate resolves or is stable. Resistance to beta lactam antibiotics may develop during therapy, as seen in our second case and in a prior case report. Despite in vitro sensitivity testing, beta lactam antibiotics should probably be avoided, or at least not administered alone. The fact that in AIDS the underlying immune defect can be expected to worsen with time further complicates therapy, and patients should be carefully reassessed for development of a resistant organism or acquisition of a new opportunistic infection should their condition deteriorate. If a patient with HIV infection and an appropriate illness has blood or sputum cultures reported as growing a "diphtheroid" or "unidentified Gram-positive rod," the possibility of *R equi* infection should be considered and antibiotic coverage broadened pending final identification of the organism.

**References**