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Thoracic Blastomycosis and Empyema

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ABSTRACT

Blastomycosis is endemic in river valley areas of the southeastern and Midwestern United States. Pulmonary manifestations include chronic cough and pleuritic pain. Radiographic appearance of the infection can mimic bronchogenic lung carcinoma. Pleural effusion is rarely associated with this pulmonary infection, and empyema has not been previously reported. We report a case of pulmonary and pleural Blastomyces dermatitidis infection presenting as empyema thoracis. Diagnosis and treatment were attained with video-assisted thoracoscopic (VATS) pleural and lung biopsy and debridement.

Key Words: Video-assisted thoracoscopy (VATS), Blastomyces dermatitidis, Pleural effusion.

INTRODUCTION

First described by Gilchrist in 1894,[1] blastomycosis was thought initially to exist in two distinct forms, cutaneous and systemic. Later investigations by Schwartz and Baum,[2] established lung as the primary portal of entry, with end organ (ie, skin, bone, soft tissue) involvement secondary to hematogenous dissemination. Endemic distribution of the organism occurs mainly along the Mississippi and Ohio River basins of the Midwestern and southeastern United States.

While there is no overall age, race, sex, or occupational predilection for the disease, people exposed to the soil in endemic areas are at greatest risk.[3,4] After inhalation of the mycelia, conversion to the yeast form occurs at body temperature (37°C). Host defense mechanisms recruit neutrophils and form non-caseating granulomas with giant cells in an attempt to contain spread of the yeast. Only one-half of infected patients are symptomatic; presenting complaints include chills, fever, and transient pleuritic chest pain. Chest radiography demonstrates lobar or segmental consolidation.[5,6]

Serologic tests for diagnosis of blastomycosis include serum complement fixation assays or antibody A identification with immunodiffusion or radioimmunoassay/enzyme-linked immunosorbent assays. All are fraught, however, with low specificity and failure to reliably diagnose the disease in the acute setting. Definitive diagnosis relies on growth of the organism from body fluids or biopsy specimens. Treatment of localized pulmonary disease with oral azole derivatives has been successful. Intravenous amphotericin B treatment is reserved for critical pulmonary infection, central nervous system disease, and infection in patients with concomitant immunodeficiency syndromes.

CASE REPORT

A 37-year-old woman presented to her primary care physician with a chief complaint of productive cough, fever to 39°C, and shaking chills. A presumptive diagnosis of pneumonia was made, sputum cultures demonstrated normal respiratory flora, and she was begun on a two-week course of oral antibiotics. Showing no

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improvement after this course of therapy, a chest radiograph demonstrated progression to a right pleural effusion. Cultures from a thoracentesis specimen were sterile. She continued to spike fevers, and computed tomography of the chest showed consolidation of the right lower lobe and re-accumulation of a loculated pleural effusion. She was transferred to our institution for further evaluation and treatment.

The patient is a well-developed, well-nourished woman in mild distress, who complained of right-sided pleuritic chest pain with inspiration and reported occasional hemoptysis. Diminished breath sounds were noted at the right base. Heart examination showed a regular rhythm and no murmurs or rubs. No skin lesions were observed, and she was neurologically intact. The peripheral white blood cell count (WBC) was 16,100 cells/mm^3. Thoracentesis revealed pleural fluid with a pH = 7.3, WBC = 2692 cells/mm^3, glucose = 105 mg/dl, LDH = 433 IU/L, and total protein = 5.5 gm/dl. Chest radiography showed persistent atelectasis of the right lower lobe with an effusion. Fiberoptic bronchoscopy demonstrated no endobronchial lesions, and sputum cultures obtained were negative at two weeks. Chest radiographs showed a right lower lobe atelectasis and a large pleural effusion **(Figure 1)**.

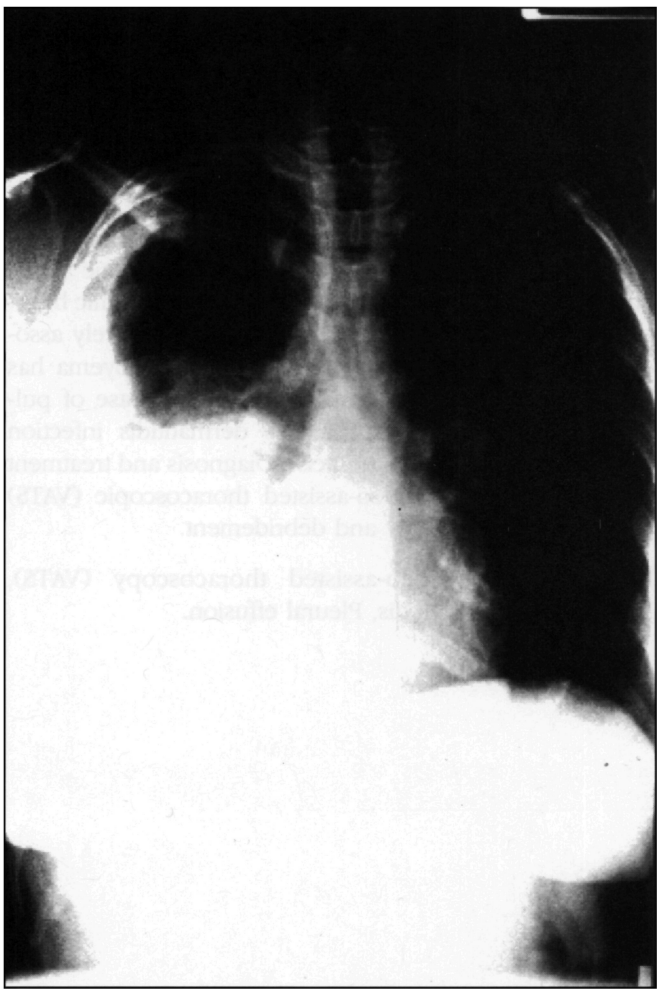

Figure 1. Chest radiograph (posterior/anterior) demonstrating right lower lobar atelectasis and a large pleural effusion.

After placement of a thoracic epidural infusion catheter, she underwent general endotracheal anaesthesia with a double lumen tube to facilitate single lung ventilation. A thick empyema with visceral and parietal pleural studding was encountered on VATS exploration. Frozen section analysis of pleural biopsy specimens was performed. Histological examination showed non-caseating granulomatous inflammation, while pleural biopsies demonstrated scattered, predominantly suppurative granulomata surrounded by fibrous tissue and occasional foci of mature adipose tissue. Higher magnification showed round yeast forms of Blastomyces species with thick cell walls, and multiple nuclei **(Figure 2)**, with occasional broad-based budding forms **(Figure 3)**.

After biopsy, an endoscopic decortication of the right thorax was performed. The patient was begun on oral itraconazole (400 milligrams) twice daily. Postoperative chest radiographs showed regression of the effusion but persistent mediastinal and hilar adenopathy. Computed tomography showed no intracranial lesions. The patient was begun on a six-week course of intravenous amphotericin B. After one week of therapy, her chest radiograph showed significant improvement. She was discharged to home on postoperative day nine. Follow-up at six months showed complete recovery and a normal chest radiograph.

DISCUSSION

Clinical presentation of pulmonary Blastomyces includes fever, chills, and pleuritic chest pain. While most cases present radiographically with lobar or segmental consolidation, this patient's recurrent effusion and pleural studding noted on video-assisted thoracoscopic examination of the thorax is uncommon. In 1964, the Blastomycosis Cooperative Study of the Veterans Administration[3] exam-

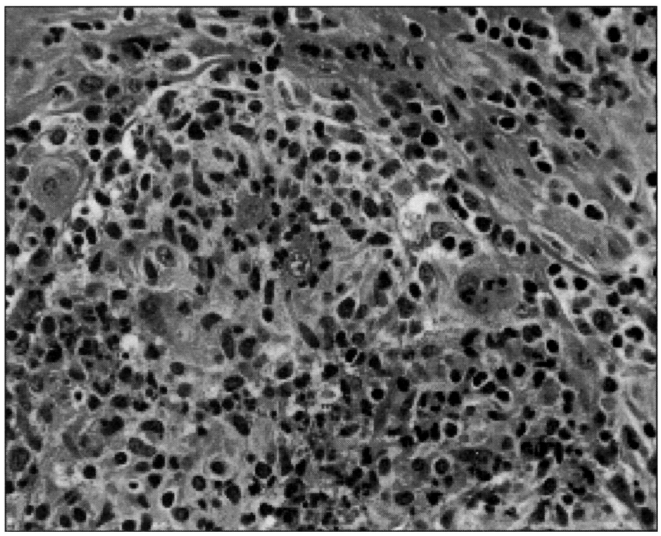

Figure 2. Photomicrograph of pleural biopsy specimen showing round yeast forms of Blastomyces with thick cell walls and multiple nuclei. (Gomori's methenamine silver stain. Magnification – 340 X)

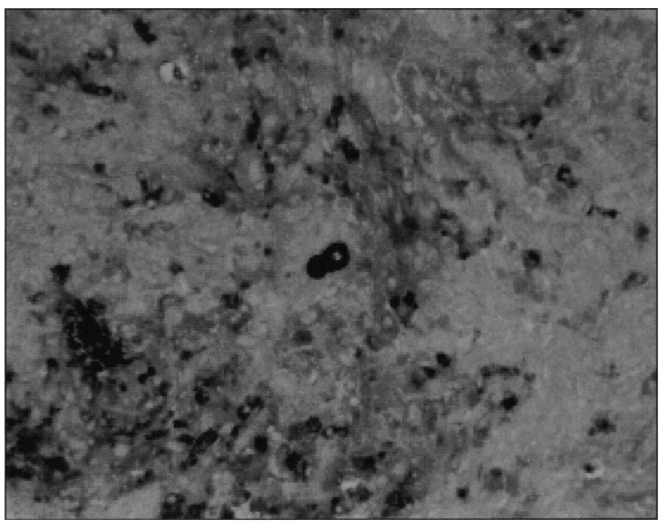

Figure 3. Photomicrograph of pleural biopsy specimen with broad-based, budding yeast forms of Blastomyces. (Hematoxylin and Eosin stain. Magnification – 340 X)

ined 198 patients with this disease and identified only four patients with effusions. Similarly, Sarosi et al.[7] found no effusions in their series of 18 patients, and Rabinowitz et al.[6] found no pleural disease in 51 patients with pulmonary blastomycosis.

Other investigators have found varying degrees of pleural involvement with this disease. Kinasewitz[8] found pleural thickening in 88% of 26 patients, but only four cases with even small effusions. Thirteen of 63 patients had small effusions reported by Sheflin and colleagues[9] in a radiographic review series. Failla[10] examined seven cases of pulmonary blastomycosis at their institution and noted the uncommon findings of two patients with large pleural effusions and one with an endobronchial lesion.

Diagnosis of blastomycosis is by culture of the organism from bronchial washings or lung biopsy specimens, or direct histopathologic identification. Granulomatous inflammation with characteristic fungal elements of large budding yeast cells with double refractile walls demonstrating Blastomyces dermatitidis are seen. Given the disease's low propensity for pleural involvement, it is not surprising that thoracentesis is generally non-diagnostic. This patient's operative finding of diffuse pleural blastomycotic studding might explain her development of a recurrent loculated effusion. It is not clear, however, why B. dermatitidis was not cultured from the two thoracentesis samples obtained, given the widespread pleural involvement, or why the patient developed hemoptysis.

The postoperative progression of hilar adenopathy prompted evaluation of her central nervous system for evidence of systemic spread of infection. Although oral ketaconazole is the preferred treatment for pulmonary blastomycosis, this patient's thoracic adenopathy and low-grade fever resulted in a six-week course of intravenous amphotericin B (33 milligrams per day).

Post-pneumonic effusion is best treated by thoracostomy tube drainage. Failure of this technique, coupled with negative sputum and effusion fluid cultures, resulted in VATS pleural debridement and biopsy. Blastomycosis pneumonia only rarely progresses to effusion and empyema. This patient's hemoptysis, loculated effusion, and hilar adenopathy are uncommonly associated with Blastomyces dermatitidis infection. Advantages of VATS over open debridement and biopsy include a limited incision with less potential for operative site infection and diminished postoperative pain while providing a thorough evaluation of the thorax and lung. We recommend VATS over the open thoracotomy with radiological localization approach for evaluation of patients with post-pneumonic effusions of unknown etiology.

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