Using local epidemiology to make a difficult diagnosis: a case of blastomycosis

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ABSTRACT

An otherwise well 21-year-old man from Northwestern Ontario presented to our emergency department in Winnipeg, Manitoba, with a 2-month history of cough, progressively increasing dyspnea, hemoptysis and a 15-kg weight loss. His symptoms were worsening despite antibiotic treatment for presumed bacterial pneumonia. His past history included work as a seasonal labourer clearing brush. He was not hypoxic on room air, but his chest radiograph revealed a miliary pattern and bilateral infiltrates. A Mantoux test for tuberculosis was non-reactive, and the sputum gram stain was unremarkable. Empiric therapy was initiated for blastomycosis and the diagnosis was confirmed with a calcofluor stain of the sputum. Although blastomycosis is rare in most regions in North America, there is an unusually high incidence of blastomycosis in Northwestern Ontario. This case highlights the intolerance and utility of knowledge of the local epidemiology in establishing difficult diagnoses of regional importance, such as fungal pneumonias.

Key words: community acquired pneumonia; Blastomyces dermatitidis; blastomycosis; fungal pneumonia

RÉSUMÉ


Case history

A 21-year-old man from Northwestern Ontario presented to an emergency department (ED) in Winnipeg, Manitoba, with a 2-month history of cough, progressively worsening dyspnea, hemoptysis and a 15-kg weight loss. The hemoptysis was characterized by blood-streaked white sputum. The patient usually worked as a seasonal labourer. His
most recent work was on a construction project clearing brush and digging ditches. Eight weeks prior to presentation to our ED, he quit working because of progressively worsening dyspnea. Two weeks prior to presenting to our ED, he presented to medical attention and was found to be afebrile with unremarkable vital signs. A chest radiograph at that time revealed a left lower lobe consolidation, and a presumptive diagnosis of community-acquired pneumonia was made. The patient was prescribed a standard course of azithromycin, but his dyspnea worsened and, upon presentation to our ED, he was unable to walk more than 10 metres without stopping to rest.

On examination, he appeared unwell but not toxic. His vital signs included an oral temperature of 38.2°C, respiratory rate of 16 breaths/min, blood pressure of 100/63 mm Hg, heart rate of 103 beats/min, and a room air pulse oximetry reading of 97%. Physical findings included dullness to chest percussion and bronchial breath sounds in the right upper and left lower lung zones with decreased air entry was noted in the left lower lung zone. The remainder of the physical examination was unremarkable.

His chest radiograph was consistent with his physical examination findings and revealed right upper and left lower lobar opacities and a small left-sided pleural effusion (Fig. 1). A complete blood count revealed a white blood cell count of $25 \times 10^9$ cells/L with 23% neutrophils. Hemoglobin and serum creatinine were normal. A sputum gram stain revealed many polymorphonuclear cells, but no micro-organisms. The patient was started on empiric broad-spectrum antibacterial therapy and also on the antifungal agent, amphotericin B. Subsequently, the calcofluor stain of the sputum confirmed the presumed diagnosis of blastomycosis (Fig. 2), and the Mantoux test, performed on admission, was interpreted as non-reactive at 48 hours.

Within 72 hours of admission, the patient’s dyspnea had resolved and he was able to walk comfortably within the hospital corridors. Unfortunately, the patient suffered acute renal failure with a maximum creatinine of 474 µmol/L (normal rage 44–106 µmol/L). Amphotericin B was discontinued and, within one week, his serum creatinine normalized. He was started on a 6-month course of itraconazole (400 mg once daily) and transferred back to his home community in markedly improved condition.

**Discussion**

North American blastomycosis is an uncommon granulomatous fungal infection caused by the thermally dimorphic fungus, *Blastomyces dermatitidis*. This organism exists in a mycelial form in the soil of warm, moist, wooded areas. When the mycelia are disturbed, the conidia are inhaled. At body temperature, *B. dermatitidis* becomes a thick-walled budding yeast. Although pulmonary manifestations are the hallmark of blastomycosis, hematogenous dissemination results in extra-pulmonary blastomycosis affecting other body systems including the skin, bones and, rarely, the central nervous system. Mortality is uncommon and occurs predominantly in older adults with chronic illnesses.

*B. dermatitidis* is distributed in the United States east of the Mississippi from Wisconsin to the Gulf of Mexico, and in the eastern Canadian provinces as far west as Northwest-

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**Fig. 1.** Chest radiograph revealed right upper and left lower lobar opacities and a small left-sided pleural effusion.

**Fig. 2.** Calcofluor stain of the sputum demonstrating broad-based budding yeast compatible with *B. dermatitidis*. 

https://doi.org/10.1017/S1481803500013221 Published online by Cambridge University Press
ern Ontario and Manitoba. The annual incidence of blastomycosis varies greatly according to geographic region. In Wisconsin and Mississippi, the annual incidence is approximately 1.4 cases per 100,000 individuals. In some regions of Canada, higher rates have been reported. For example, an annual incidence rate of 7.1 cases per 100,000 individuals has been reported in the Kenora, Ontario district, and one study reported a rate of more than 117 cases per 100,000 individuals in a small region within this district.

The incubation period of blastomycosis ranges from 30 to 45 days. The most frequent symptoms of pulmonary blastomycosis are a productive cough with or without hemoptysis (93%), fatigue (82%), dyspnea (77%), fever (73%), weight loss (68%), night sweats (68%) and chest pain (58%). Radiographic manifestations are varied, ranging from distinct lobar consolidations indistinguishable from a bacterial pneumonia to widely disseminated small lung nodules throughout both lung fields indistinguishable from miliary tuberculosis. Given the clinical similarities between pulmonary blastomycosis and the more common pulmonary tuberculosis, the diagnosis of blastomycosis will not be made if cases are presumed to be tuberculosis. Confirmation of the diagnosis of blastomycosis rests upon either visualization of the broad-based budding yeast in sputum or tissue, or culture of Blastomyces dermatitidis. Serologic assays are available but they have insufficient specificity and sensitivity to establish the diagnosis of acute blastomycosis.

The type and duration of blastomycosis therapy is based on the clinical status of the patient. Seriously ill patients should receive parenteral amphotericin B. Once clinically stable, long-term therapy with an oral azole antifungal agent such as itraconazole may be initiated. The empiric initiation of antifungal therapy depends on local epidemiology. This patient had symptoms consistent with either pulmonary tuberculosis or blastomycosis, so we were able to confidently initiate empiric blastomycosis therapy because he was not immunocompromised, his Mantoux test was negative, and he came from an area with a high incidence of pulmonary blastomycosis.

Conclusion

This case demonstrates the utility of local epidemiology in establishing a difficult diagnosis like acute pulmonary blastomycosis. Emergency physicians practising in Northwestern Ontario and Manitoba, or treating patients from these regions, should be aware of the high incidence of blastomycosis in this region and consider this diagnosis in patients who present with symptoms more commonly associated with pulmonary tuberculosis. In addition, practitioners assessing patients from these endemic areas, regardless of where they present, should maintain blastomycosis in the differential diagnosis of a non-resolving pneumonia, particularly if other etiologies have been excluded.

Acknowledgment: We acknowledge the excellent secretarial skills of Ms. Carolyn Garlinski in the preparation of this document.

Competing interests: None declared.

References


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