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Case Report Open Access

Blastomycosis in Quebec, Canada: Highlighting the Importance of Exposure to Decaying Wood in Patients

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Abstract

Blastomycosis is a systemic and cutaneous fungal infection of humans, dogs, cats and other animals that has been reported from parts of North America, Africa and India. In most areas the disease occurs predominantly in individuals exposed to rural agricultural, recreational or wilderness environments. The precise ecological niche for *Blastomyces dermatitidis* remains undefined. In the current work we report a series of cases of blastomycosis in Quebec associated with exposure to wood as a possible source of infection. This work is consistent with previous reports that demonstrate that wood and wood by-products are able to support the growth of *B. dermatitidis* and can play an important role in disease pathogenesis. Our findings suggest that it may be important to question blastomycosis patients about exposure to decaying wood as a possible source for acquiring the infection.

Keywords: Blastomycosis, Decaying wood; Quebec; *B. dermatitidis*

Case Report

Blastomycosis is a rare, but potentially fatal infection caused by thermally dimorphic fungus *B. dermatitidis*. The disease primarily affects humans and dogs who are predominantly, but not exclusively, exposed to rural agricultural, recreational or wilderness environments [1,2]. Furthermore, humans and their pets have been often found to share the same source of exposure [3]. Thus, it is believed that the incidence of the disease in animals is a surrogate for the prevalence of fungus in the environment and, possibly, an indicator for blastomycosis in humans. In Canada, the disease is endemic to provinces that surround the Great Lakes (i.e., Ontario, Manitoba) and in the province Quebec [1,4-6].

Since blastomycosis is not a reportable disease except for few hyperendemic areas in the United States and Ontario, Canada, our knowledge is primarily based on the studies of disease outbreaks or exposure histories in these hyper-endemic regions [1,7]. The advantage of studying this condition in such areas is that there is an increased disease awareness amongst primary care physicians, which leads to a significantly higher rate of case identification [1,8]. Based on these studies, blastomycosis has a very high (i.e., 50-86%) attack rate after exposure [2,7]. However, in 39-54% of patients the infection is asymptomatic [7]. In patients, who are symptomatic, illness typically begins 30-45 days after exposure and often manifests as mild self-limited pulmonary infection or "summer cold" [2,7]. Therefore, in many cases the disease does not come to the attention of a physician and/or has a high risk of being misdiagnosed. Hence, only severe and recalcitrant cases of blastomycosis are likely to be appropriately diagnosed.

Understanding of the origin of blastomycosis and natural habitat has been limited by difficulty in culturing the organism from the environmental sources. To date, only few reports exist of successfully culturing the fungus from natural sites [7,9,10]. Based on these reports, it is presumed that the fungus preferentially resides in moist acidic soil that is rich in decaying organic material and animal excreta [10-17].

Our recent experience in a mycology clinic at the Royal Victoria Hospital, McGill University Health Centre highlights that in a number of cases, individuals were exposed to wood as a possible source of blastomycosis. We summarize pertinent clinical data from 4 such cases below. Each patient provided informed consent to publish their case and, where applicable, pictures of the lesions.

Case 1

50 year-old male from Montreal, Quebec presented to a community hospital in January 2009 with symptoms of productive cough, weakness, malaise and weight loss. A chest X-ray at that time documented a consolidation in the right upper lobe and a broncho-alveolar lavage (BAL) sample obtained weeks later yielded a culture positive for *B. dermatitidis*. Because the patient's symptoms were resolving at the time of culture positivity, the treating physician opted to observe the patient without antifungal therapy. Prior to this episode the patient reported no recent travel and did not engage in any wilderness activities or camping. The patient resides in a small town and heats his home with a wood stove. After the initial disease episode, the patient developed a number of waxing and waning skin lesions on his right hand, right thigh and face, all of which he attributed to being "burned by the stove". He was referred to our clinic at the Royal Victoria Hospital in July 2010 for evaluation of his fungating, crusting skin plaques (Figure 1). A diagnosis of cutaneous blastomycosis was established by culture of the skin lesions. His urine antigen test for blastomycosis at that time was negative (0.8 ng/mL, normal range 0-1 ng/mL) and the computer tomography (CT) study of his chest did not reveal any abnormalities. The patient was treated with a 6-month course of itraconazole and experienced complete resolution of his skin lesions. He was free of recurrence at the time of his 2-year follow up visit.

Case 2

31 year-old male native of Montreal, Quebec went camping on his property near La Chute, QC to watch a meteorite shower in August 2009. While camping, he built a campfire from wood that he found on his property. Three weeks later he developed cough, fever, night sweats and weight loss of ~7 kg. He was initially observed and treated conservatively

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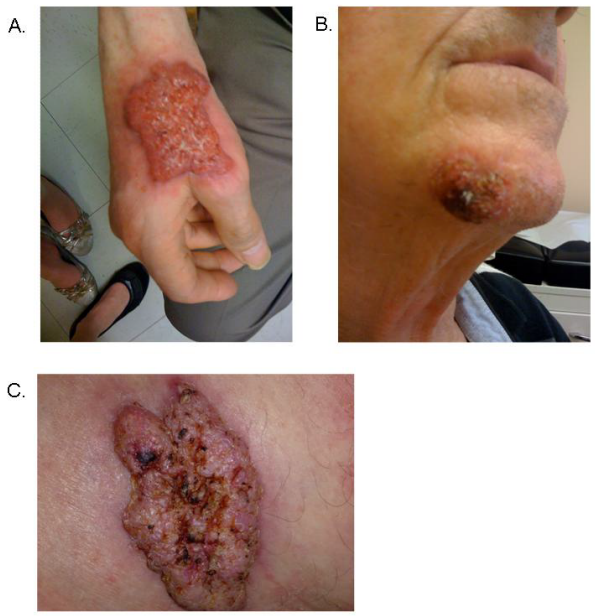

Figure 1: Clinical presentation of cutaneous blastomycosis in a 50 year old male (Case 1). Classical verrucous fungating plaques observed on the hand (A), chin (B) and thigh (C).

by his family physician, but was eventually referred to a tertiary care centre for evaluation. CT chest imaging at this time showed a large cavitating lesion in the left upper lobe. A BAL sample was obtained and was positive on microscopy and culture for *B. dermatitides*. The urine blastomycosis antigen test was weakly positive (1.08 ng/mL) at the time of initial work up. The patient was immediately started on a 6-months course of itraconazole treatment. At the time of his three-month follow up evaluation, the urine antigen test had become negative (0.5 ng/mL). Follow up CT imaging of his chest showed gradual improvement in his left upper lobe lesion.

Case 3

A 47 year old Lebanese male, who works as a taxi driver in Montreal, QC, presented to his family physician in August 2006 with a two month history of haemoptysis, weight loss and night sweats and was referred to a tertiary care centre for evaluation. He reported that 4 months earlier, he visited a forest shrine near Hudson, QC. As part of his pilgrimage, he had to crawl through a forested path on his knees to the shrine. On his evaluation in August 2006, CT imaging findings were suggestive of right lower lobe carcinoma with obstructive pneumonitis. However, subsequent bronchoscopy yielded a BAL sample that was positive for *B. dermatitidis* based on microscopy and culture. Consistent with these findings, his urine antigen test was also weakly positive for blastomycosis (1.2 ng/mL). The patient was treated with a 6 months course or oral itraconazole and had complete recovery from his symptoms. Follow up imaging in January and March 2007 showed residual opacity in the right lower lobe.

Case 4

21 year old male university student from Laval, Quebec worked in a summer camp in 2006, where his duty was to stock firewood. Later in November, he developed productive cough and associated chest pain. He was evaluated in a student health clinic, where a chest X-ray was performed and the patient was given a course of moxifloxacin treatment. His symptoms progressed from November 2006 to January 2007 with ongoing productive cough, pleuritic chest pain and occasional episodes of haemoptysis. During that time he also experienced night sweats, fever, anorexia and weight loss. In February 2007 he was referred to our hospital for evaluation. At that time, a chest X-ray documented an area of mass like consolidation in the left perihilar area. A bronchoscopy was performed and a BAL sample was obtained, which yielded a positive culture for *B. dermatitidis*. A urine antigen test was negative at the time of initial diagnosis (0.62 ng/mL). Patient was treated with itraconazole, but experienced an elevation of transaminases. Therefore, he was switched to a high-dose fluconazole for a total of 6 month duration that effectively treated his pulmonary blastomycosis. A follow up CT chest study showed persistent scar at the site of previous mass and no other suspicious lesions.

Previous reports established a number of risk factors for acquiring the infection, which include outdoor riverside camping, fishing and swimming, gardening with shovels and tools, weed clearing, digging holes, hunting, trapping, climbing into holes, etc. [3,8]. Exposure to the environment after a rain or in the presence of mist or dew is also suspected to be a risk factor, since moisture or rain may play an important role in liberating and aerosolizing the conidia [2,7,8]. Exposure to wood has also been previously suggested as a possible risk factor [8]. Specifically, a number of studies documented visiting and exploring beaver lodges or beaver dams as possible risk factors [7,8]. Other reports describe building log cabins [13], cutting trees [8], exposure to hollow or dead trees [8], exposure to wood pipes [9], injury by a rotten piece of wood [18], exposure to rotten wood [7,14], working in forestry [19,20] or wood pulp industry [21] as additional risk factors for acquiring blastomycosis. Furthermore, a number of analyses were able to isolate *B. dermatitidies* from wood [7,9,15], while others documented that wood and bark are able to support the growth and sporulation of this fungus [10,15]. Thus, there is a possibility that the fungus may be present in both the decaying wood and the surrounding soil. Our findings taken together with previous experimental work indicate that it may be important to question blastomycosis patients about exposure to decaying wood as a possible source for acquiring the infection.

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