



Blastomycosis in a postpartum dog



David L. Panciera^{a,*}, Gregory C. Troy^{a,1}, Beverly J. Purswell^b

^a Department of Small Animal Clinical Sciences, Virginia–Maryland Regional College of Veterinary Medicine, Virginia Tech, Blacksburg, VA 24061, USA

^b Department of Large Animal Clinical Sciences, Virginia–Maryland Regional College of Veterinary Medicine, Virginia Tech, Blacksburg, VA 24061, USA

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ABSTRACT

Transplacental infection with *Blastomyces dermatitidis* is rare in humans and unknown in the dog. A Doberman pinscher bitch was diagnosed with blastomycosis 25 days after whelping. Clinical signs were noted after whelping and were progressive. All 9 pups were free of clinical signs and had negative urine *Blastomyces* antigen tests at 6 weeks of age and remained free of signs of illness through 11 months of age. The bitch responded to treatment with itraconazole.

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1. Introduction

Blastomycosis is a common enzootic systemic mycosis in dogs which are much more susceptible to disseminated infection than humans [1]. Infection during pregnancy has occasionally been reported in women, with immunosuppression associated with pregnancy possibly playing a role in susceptibility [2–13]. Systemic infection has the potential to result in transplacental infection of the fetus, as has been rarely reported in humans [14,15]. To the authors' knowledge, infection with *Blastomyces dermatitidis* has not been reported in the pregnant bitch. The purpose of this report was to describe the course of blastomycosis diagnosed in a bitch postpartum and the potential for transmission to offspring.

2. Case

A 5 year-old female Doberman pinscher was evaluated on day 0 for tachypnea and increased respiratory effort of 5 weeks duration. The multiparous bitch had whelped a litter of 9 healthy pups day-25 before presentation. All pups were deemed healthy by the owner at the time of the bitch's initial evaluation and were nursing normally. The dog's appetite had been normal until the day before presentation when it declined to eat. The dog lived on a farm in southwestern Virginia and was walked with supervision around much of the property.

Pertinent physical examination findings included a rectal temperature of 37.8 °C, respiratory rate of 40 breaths/min, pulse rate of 84 beats/min, increased bronchovesicular sounds on auscultation, a cough that was elicited on tracheal palpation, and discomfort during palpation of the cranial abdomen.

Thoracic radiograph abnormalities consisted of a diffuse, patchy interstitial pattern coalescing to form a nodular pulmonary pattern, and enlarged perihilar and sternal lymph nodes. Thoracic ultrasound, performed in order to obtain a fine needle aspirate of the lung, showed multiple hypoechoic pulmonary nodules in the periphery of the lung. Abdominal ultrasound was unremarkable, with a slightly thickened uterine wall consistent with normal postpartum change. Leukocytosis (17,600/ μ l) characterized by a mature neutrophilia (14,080/ μ l) and monocytosis (1936/ μ l) was present on complete blood count. Plasma biochemical abnormalities included a glucose concentration of 75 mg/dl (88–121), decreased BUN (7 mg/dl; reference interval 9–30 mg/dl), decreased creatinine (0.6 mg/dl; reference interval 0.7–1.3 mg/dl), hypoalbuminemia (2.0 g/dl; reference interval 2.3–3.7 g/dl), hyperglobulinemia (4.6 g/dl; reference interval 2.1–3.8 g/dl), and a mild elevation of alkaline phosphatase activity (104 U/l; reference interval 16–75 U/l). Pyogranulomatous inflammation with organisms consistent with *B. dermatitidis* was present on cytologic examination of samples of lung obtained by percutaneous fine needle aspiration.

Urine was submitted for a *Blastomyces* quantitative antigen enzymatic immunoassay and was positive at 13.53 ng/ml. Treatment with itraconazole (5.7 mg/kg PO once daily) and prednisone (0.42 mg/kg PO once daily for 20 days) was initiated day 0. A transient right forelimb lameness developed day 2, but resolved the same day. The dog's appetite returned to normal within 1 day

* Corresponding author. Tel.: +1 540 231 4621; fax: +1 540 231 0431.

E-mail address: panciera@vt.edu (D.L. Panciera).

¹ Drs. Panciera and Troy contributed equally to this work.

of initiating treatment and the increased respiratory effort and rate resolved within 1 week of beginning treatment. On day 7, the dog's temperature was 103.0 F, respiratory rate was 28 breaths/min, and auscultation of the lungs was normal. Manipulation of the elbow resulted in a slight reaction consistent with pain. The prednisone and itraconazole were continued at the same dosages. Thoracic radiographs obtained day 112 showed a mild, diffuse interstitial pulmonary pattern consistent with resolved fungal pneumonia. *Blastomyces* antigen concentration decreased progressively during treatment with itraconazole, with concentrations of 5.07 ng/ml, 1.23 ng/ml, 0.64 ng/ml, and <0.2 ng/ml but detectable at days 112, 161, 210 and 266, respectively. Itraconazole administration was discontinued at day 266. The bitch has remained free of signs of illness throughout the time of writing, 44 weeks after diagnosis.

Because of concern regarding transplacental infection of the pups, a *Blastomyces* antigen concentration was measured in the urine of all 9 pups within 7 days of diagnosis of infection in the bitch. No *Blastomyces* antigen was detected in any of the samples. All pups have remained free of clinical signs of infection through last communication with all owners 11 months after birth.

3. Discussion

In the dog, infection with *B. dermatitidis* resulting in clinical disease is nearly always disseminated, thus the possibility of transmission of infection to pups was considered. Because the bitch had clinical signs consistent with pulmonary disease immediately after whelping, it is very likely she was infected while pregnant. Perinatal blastomycosis has not, to the authors' knowledge, been reported in dogs and is quite rare in humans [13,14]. The proposed pathogenesis of infection is either by transplacental spread or aspiration of infected fluid during birth. Placental infection was reported in an infected woman who gave birth to a healthy infant that had no evidence of infection [6,7]. Pulmonary infection is the most common location for infection in infants. Extensive infection of the uterus and ovaries of one woman whose infant died of pulmonary blastomycosis at 18 days of age raises the possibility that transplacental infection was the route of infection in the infant [13,15]. Although reports are few, most women with blastomycosis during pregnancy are reported to give birth to healthy offspring without evidence of perinatal infection [2,3,6–10].

Lack of infection of the pups in the present report was established by lack of clinical signs and negative tests for *Blastomyces* antigen in the urine. The high sensitivity of this assay in urine (93.5–100%) indicates that infection of the pups was very unlikely [16,17]. Supporting the lack of infection is that all pups have remained healthy through 11 months of age. While this report involves only a single litter, the rarity of perinatal infection in humans and the fact that the placenta of the dog may form a more effective barrier from maternal infection than that of women, supports that transplacental infection is unlikely. Infection during parturition by inhalation of infected maternal fluid is possible. However, because pups are usually contained within the placental sac throughout parturition, this method of transmission is less likely in dogs than humans. Regardless, it seems prudent to evaluate offspring of bitches that are diagnosed with blastomycosis during pregnancy or soon after whelping.

Transplacental infection occurs with many organisms in the dog, including nematodes, protozoa, bacteria, and viruses. The lack of reports of transplacental infection of systemic mycoses in the dog may relate to the sporadic nature of fungal infections, infection from the environment rather than transmission between individuals, and the relative infrequency of infection in pregnant bitches.

The bitch in this report had several factors that may have contributed to infection. Doberman pinschers have been reported to be predisposed to blastomycosis, but a reason for this has not

been established [18,19]. Pregnancy results in impaired cell-mediated and humoral immunity. Of particular interest relating to fungal infections is the reduction in CD4 and CD8 T cells and natural killer cells that occurs during pregnancy [20]. Pregnant women suffer an increased susceptibility to sepsis, disseminated coccidioidomycosis, and fatalities resulting from viral infections [21]. Reports of systemic blastomycosis in pregnant women are few, but the immunosuppression associated with pregnancy has been suggested to play a role [2]. Little is known about the effects of pregnancy on immune function in dogs, so it is unclear if immunosuppression played a role in the blastomycosis in the present report. The dog is housed on a farm in an area endemic for *Blastomyces*, so it is unclear if any of the above factors played a role in infection.

Conflict of interest

There are none.

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