Case report

Identification of *Blastomyces dermatitidis* in the stool of a dog with acute pulmonary blastomycosis

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We report the identification of *Blastomyces dermatitidis* by microscopic examination of a direct faecal smear from a dog with pulmonary blastomycosis. A simultaneously obtained faecal culture grew *Blastomyces dermatitidis*. The fungus was also cultured from a transtracheal sample from this same dog. This report suggests that yeast-phase cells of *B. dermatitidis* may be recovered in the stool of dogs with pulmonary blastomycosis following transit through the gastrointestinal tract of swallowed infected sputum. Implications regarding the ecology of *Blastomyces dermatitidis* are discussed.

Keywords blastomycosis, *Blastomyces*, mycoses, dog diseases

Introduction

Blastomycosis [1,2], a systemic and cutaneous fungal infection of humans, dogs and other animals, is endemic in eastern North America and parts of India and Africa. It may cause asymptomatic, mild or fulminating pulmonary or disseminated disease in humans, and variable signs and severity of illness in animals [3]. The epidemiology [4] and, particularly, the ecology [5] of blastomycosis remains undefined; however, in highly endemic areas, a close proximity to waterways and exposure to excavation appear to be risk factors for the disease [6]. In such areas, the geographical distribution of human [7] and dog [6] cases appears to be similar, presumably due to common environmental exposure. Except for very rare instances of dog bite, person-to-person and animal-to-human transmission is not felt to occur [4].

We report a novel case of *Blastomyces dermatitidis* identified in the stool of a dog and discuss the clinical and ecological aspects of this finding.

Case report

A 9-year-old previously healthy, 11 kg, neutered male Cocker Spaniel was presented with several days of cough.

The dog resided in an area highly endemic for blastomycosis, just west of Eagle River, WI, USA [6,7]. Rectal temperature was 39 °C. There were no external or mucous membrane lesions or joint abnormalities by physical examination. Auscultation revealed bronchial and tracheal rales. Chest radiograph revealed no gross radiographic lesions. Sulfadimethoxine/ormetoprim 240 mg orally once daily was initiated for the presumptive diagnosis of kennel cough.

Six days later, he returned with significant clinical deterioration including a more severe cough, anorexia and pulmonary congestion. Rectal temperature was 40 °C. Repeat thoracic radiograph revealed interval changes of caudal lobe congestion. A transtracheal swab examined microscopically by direct smear using new methylene blue, revealed numerous round, large, broad-based, single budding yeast cells, consistent with *Blastomyces dermatitidis*. Similarly, a methylene blue faecal smear, and a sodium nitrate stool preparation, examined microscopically revealed typical *Blastomyces* yeast cells (Fig. 1A).

Simultaneously, a faecal sample was obtained on modified Stuart’s bacterial transport medium, kept refrigerated for 7 days, then plated on yeast-extract phosphate (Smith’s) medium with one drop of ammonium hydroxide and on Sabouraud glucose agar supplemented with 1 mg ml⁻¹ streptomycin and 1000 units ml⁻¹ penicillin G and incubated at room temperature. Both plates yielded mould colonies consistent with *B. dermatitidis*. These
agiar medium containing, per litre, 5 g allantoin, 20 ml glycerol, 1 g K$_2$HPO$_4$, 0.5 g MgSO$_4$ × 7H$_2$O, 0.5 g yeast extract; pH = 7. This medium was empirically developed as a modification of other nutritional-conversion media [8] for rapid 37 °C and room-temperature yeast conversion (D. J. Baumgardner, unpublished results).

Despite treatment with 100 mg fluconazole orally daily beginning at the second visit, the dog died 5 days later of respiratory failure. No new physical findings had been identified. The owners declined necropsy.

**Discussion**

This is believed to be the first report of *B. dermatitidis* demonstrated in the stool of a dog. A MEDLINE search and a review of the literature on blastomycosis revealed only a single report of a human case with *B. dermatitidis* in the stool [9]. *Blastomyces dermatitidis* may be recovered in the stool of bats experimentally infected intraperitoneally [10] and orally [11], and has been demonstrated in the saliva of a dog with the fungus in sputum [12].

We hypothesize that *B. dermatitidis* was demonstrable in the stool of this dog after his swallowing of sputum, and the organism surviving transit through the gastrointestinal tract. This is the explanation offered by Witorsch and Utz in their single series of six positive stool cultures [9], all from humans with positive sputum cultures.

The alternative hypothesis, faecal contamination from an anal or gastrointestinal lesion, cannot be excluded due to inability to necropsy; however, this seems less likely because of the lack of observable anal or rectal lesions and the rarity of gastrointestinal disease in dogs [3].

Studies to determine the sensitivity of microscopic examination of direct stool preparations to diagnose pulmonary blastomycosis are suggested, as this technique may represent a rapid diagnostic alternative to more invasive pulmonary examinations in difficult-to-diagnose cases in humans and dogs.

Finally, this case raises the question of whether *B. dermatitidis* may be spread in the environment by the faeces of infected dogs. The significant difficulty of isolation of *B. dermatitidis* from soil [5] suggests that many soils are inhospitable to *B. dermatitidis*. Mycelial forms appear to be inhibited by drying [13] and by soil streptomyces and other bacteria [14] and fungi [15]; and yeast-phase cells are also lysed in soils [12]. Nonetheless, *B. dermatitidis* has been shown to persist in certain soils following inoculation by excrements of naturally infected dogs. Specifically, the fungus was cultured from soil 1 week following presumed contamination from saliva [12] and 2 years following presumed contamination by
purulent exudates of soil in a tobacco-stripping shed [16]. Perhaps, on rare occasions, B. dermatitidis is spread in the environment by the chance excretion of yeast-phase organisms in the stool of an infected dog into soil hospitable to this fungus. Confirmation of this hypothesis may in part await the development of improved technology for the demonstration of B. dermatitidis in natural soils beyond our present culture methodology [5].

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References