



Case Report

Nasal cryptococcosis in a sheep in Brazilian Semi-Arid

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Abstract

A case of nasal cryptococcosis is reported in a two years old male hair sheep in the Brazilian semi-arid. Severe respiratory signs and a mass occupied a large portion of the right nasal cavity were observed. Cryptococcosis was diagnosed by the typical histologic appearance of the fungus.

Key words: *Cryptococcus*; nasal cavity; Brazilian Semi-Arid

Introduction

Cryptococcosis is a potentially fatal, systemic, granulomatous fungal infection that affects mammals, such as humans, dogs, cats and horses, as well as bird, reptiles and some invertebrates. It is caused by two fungal species: *Cryptococcus neoformans*, with the varieties *grubii* (serotype A) and *neoformans* (serotype D); and *C. gattii* (serotypes B and C) (3). Bird excrement is a source of infection and pigeons play an important role as a reservoir of *C. neoformans* in the urban environment and *C. gattii* has been isolated from several tree species (3). However, both species are isolated from a large variety of biological and environmental samples (19, 22). Infections by *C. neoformans* are more common in immunocompromised individuals and *C. gattii* has emerged as a primary pathogen of healthy hosts (3). Both species cause human infections all over Brazil, causing mainly nervous system and respiratory infections (9, 16, 22).

Cryptococcosis in animals can be due to both species *C. gattii* and *C. neoformans* (2, 5, 21, 33). It is common in cats and less frequent in dogs causing rhinitis, skin lesions mainly of the nose and head, meningitis, ocular lesions, and systemic disease (5). In horses, the infection by *C. neoformans* has been associated to rhinitis (27, 34), meningitis, encephalitis, nasal granuloma, pneumonia, abortion with mycotic

placentitis and pneumonia in the fetus (14, 24, 26). A case of cryptococcosis of the skin and subcutaneous tissue is reported in a donkey (13). In goats *C. gattii* causes epidemic outbreaks of pneumonia and encephalitis (28). Mastitis by *Cryptococcus* spp is reported in goats (31), sheep (30), cattle (18), and buffalo (21).

In Brazil, in domestic animals, cryptococcosis was reported for the first time in a sheep with pulmonary infection (8). Pulmonary lesions in a sheep slaughtered for consumption (15) and a case of rhinitis (23) are also reported. The disease is more frequent in dogs (4, 11, 12, 20), cats (6, 17), and horses (14, 34). A case of meningoencephalitis by *C. neoformans* was recently reported in a bovine (10).

The aim of the present paper is to report a case of nasal cryptococcosis in a sheep in Brazilian Semi-Arid.

Case Report

A ram two and a half-years-old hair sheep of the Santa Inês breed, weighing 98 kg, was admitted at the Bovine Clinic of the Federal Rural University of Pernambuco, Campus of Garanhuns, state of Pernambuco, Northeastern Brazil. Approximately two weeks earlier, the sheep had suffered head trauma in a fence and, five days later, an increased volume of the

right inner nasal cavity appeared. During the physical exam, the animal was alert, presenting congested conjunctiva and enlarged right pre-scapular and submandibular lymphnodes. Percussion of the nasal sinus produced a dull sound in the frontal region near the nostril. The presence of hemorrhagic granulation tissue was noted, inside the right nasal cavity (Figure 1). The animal exhibited tachypnea with polypnea, and inspiratory dyspnea accompanied by audible expiratory grunt. The animal had been vaccinated for clostridiosis and treated with anti-helminthic.



Figure 1: Nasal granulation tissue in sheep.

The examination of the nasal cavity revealed a pendulous mass with a rough appearance that occupied a large portion of the right nasal cavity, compressing the septum and causing partial occlusion of the left nasal cavity. The animal remained at the clinic for 31 days, during which time it had a reduced appetite, a variable degree of dehydration, an area of alopecia in the region of the nasal sinus, and softening of the nasal bone structure. At that time it also exhibited an abdominal breathing pattern with respiratory noises, severe inspiratory dyspnea, sporadic cough, moments of apnea, and fetid muco-purulent nasal secretion.

The animal was submitted to penicillin-based antibiotic treatment (Pencivet Plus PPU/Intervet) at 24-hour intervals and also received three applications of dexamethasone (Azium/Schering-Plough). Daily cleaning of the nostril was performed with a boric acid solution, along with massage with dimethyl sulfoxide in the sinus and daily nasal atomization with physiologic solution but without satisfactory results.

Due to the unsuccessful therapy it was decided to remove the mass surgically. The animal was submitted to 24 hours of fasting and tranquilization with 0.05 mg/kg of acepromazine. Due to the severity of the clinical condition and compromised respiratory function, the animal died during the procedure and was necropsied.

The macroscopic exam of the nasal cavities revealed a light-colored mass, measuring approximately 25 cm in length, with an irregular shape, gelatinous aspect, brittle consistency and surface with polypoid nodules. This mass originated in the right

nasal mucosa and infiltrated the adjacent structures, extending throughout the entire nasal cavity from the nasal vestibule to the ethmoid bone, causing facial deformity and obstructed airflow. Resorption of the right nasal bone and nasal turbinate bones (dorsal and mid) was also noted. The remaining organs did not exhibit any significant lesion.

Fragments from different regions of the mass were collected, fixed in 10% buffered formalin, embedded in paraffin, sliced to 5-6 μm and stained with hematoxylin-eosin (HE), periodic acid-Schiff (PAS) and Alcian Blue. Microscopically, the lesion was a locally extensive, necrotizing granulomatous rhinitis, with infiltration by macrophages, lymphocytes and plasma cells. Extensive areas of necrosis were also observed. Myriads of round or oval leavuriform structures, with a thin basophilic wall, measuring approximately 5.0 to 20 μm in diameter were present within the exudate. Surrounding the yeasts, there was a light halo not stained by HE, giving a soap bubble appearance, which was stained by Alcian blue and PAS (Figure 2). These characteristics are typical of *Cryptococcus* spp. There was also moderate proliferation of the fibrous tissue, areas of hemorrhage, and infiltration neutrophils in the periphery of the lesion.

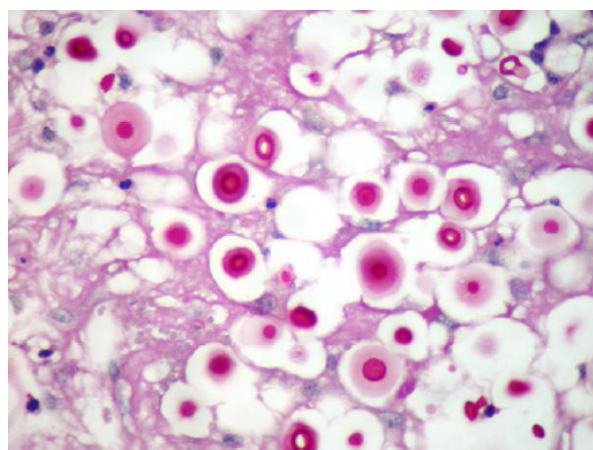


Figure 2 Sheep with nasal cryptococcosis. The histologic section of the nose shows numerous yeast of *Cryptococcus neoformans* and few inflammatory cells. PAS. X40.

Discussion

Cryptococcosis is a rare disease in sheep causing mastitis (30) or pulmonary infections (8, 15). In this case the lesion was localized in the upper respiratory tract causing rhinitis. Similar lesions had been reported in cat, dogs (5) and horses (27, 34). Pulmonary and cerebromeningeal cryptococcosis are the main form of the disease in humans and farm animals (2, 8, 9, 10, 14, 15, 16, 22, 26, 28). The infection of the nasal cavity seems to be by inhalation of spores (3, 5). However pulmonary infections occur more frequently following inhalation and deposition of the spores into the pulmonary alveoli (3, 5).

Cryptococcus spp are neurotropic and can invade the central nervous system from the respiratory tract either hematogenously or via direct extension through the cribriform plate (7). In this case the infection probably occurred due to spore inhalation from the environment, where the contamination was very probably due to the presence of ground, decomposed vegetables, and bird and bat feces, which are found both in urban and rural areas of Brazil (22). Also the semi-intensive livestock farming frequently used in Northeastern Brazil and the Semi-Arid climate may increase the infection risk in farm animals. It is also possible that the head trauma that the animal suffered before the onset of the clinical signs favored the infection by the fungus.

The clinical findings of inspiratory dyspnea and difficulty in the airflow in the upper respiratory tract observed in this case are similar than those reported in other species (5, 34). However, these findings are most often accompanied by chronic pneumonia, emaciation and even neurological signs (5, 28), not observed in this case. The gelatinous aspect and polypoid formations found in the mucosa of the nasal cavity are similar to those observed in cases of cryptococcosis in other species (7). The deformation of the nasal cavity causing an obstruction to airflow was also reported (7).

The frequency of cryptococcosis in the Semi-Arid is unknown, but a similar case of the disease, also in a Santa Inês sheep, was reported in southeastern Brazil (23). Most aspects of nasal cryptococcosis in sheep are similar than those observed in conidiobolomycosis (25, 32) and nasal phytiosis (25), which are very common diseases in sheep in northeastern Brazil, but also occur in other Brazilian regions (1, 29). Both disease cause lesions in the nose, but in conidiobolomycosis the lesions affect the rinopharyngeal region (25, 32) and in pythiosis of the rinofacial region (25, 29). Histologic and microbiologic examinations are important for the differential diagnosis of these three diseases in sheep.

Sheep with cryptococcosis could contaminate the environment. However, it is questionable to what extent these animals represent a danger to public health or other animals, as it is not clear whether *Cryptococcus* spp can be transmitted between animals or from animals to humans (5). The euthanasia of animals infected with cryptococcosis is recommended, due to the lack of effective medications and potential public health risks. Few farm animals infected by the disease are treated, as treatment is long, expensive, has a large number of side effects and there is a frequent occurrence of relapse (34).

References

1. BOABAID FM., FERREIRA EV., ARRUDA LP., GASPARETTO ND., SOUZA, RL., SILVA MC., DUTRA V., NAKAZATO L., COLODEL EM. Conidiobolomycose em ovinos no Estado de Mato Grosso. *Pesq. Vet. Bras.*, 2008, 28, 77-81.
2. BARÓ T., TORRES-RODRÍGUEZ JM., DE MENDOZA MH., MORERA Y., ALIA. C. First identification of autochthonous *Cryptococcus neoformans* var. *gattii* isolated from goats with predominantly severe pulmonary disease in Spain. *J. Clin. Microbiol.*, 1998, 36, 458-461.
3. BOVERS M., HAGEN F., BOEKHOUT, T. Diversity of the *Cryptococcus neoformans-Cryptococcus gattii* species complex. *Rev. Iberoam. Micol.*, 2008, 25, S4-12.
4. BROLO MDI., BARBOSA ALT., CAVALHEIRO A., LOPES STA., SANTURIO JM., SCHOSSLER JE., MAZZANTI A. Diagnóstico de criptococose canina pela citologia aspirativa por agulha fina. *Ciência Rural*, 2008, 38, 826-829.
5. CASTELLÁ G., LOURDES ML., CABAÑES FJ. Criptococosis y animales de compañía. *Rev. Iberoam. Micol.*, 2008, 25, S19-S24.
6. CORREA GLB. Criptococose em gatos. *Ciência Rural*, 1994, 24, 431-437.
7. COSWELL JL., WILLIAMS KJ.. The respiratory system. In: MAXIE MG. *Jubb, Kennedy, and Palmer's pathology of domestic animals*. 4ª Ed. San Diego: Academic Press, 2007, V2, p. 643-644.
8. DACORSO FP., CHAGAS WA. Criptococose pulmonar em caprino. *Anais. Col. Anat. Bras.* 1957, 3, 55-69.
9. DARZÉ C., LUCENA R., GOMES I., MELO A. Clinical and laboratory characteristics of 104 cryptococcus meningoencephalitis cases. *Rev. Soc. Brasil. Med. Trop.*, 2000, 33, 21-26.
10. GALIZA, GJN.; SILVA, MLCR.; DANTAS, AFM.; SIMÕES, SVD.; RIET-CORREA F.. Doenças do sistema nervoso de bovinos no semiárido nordestino. *Pesq. Vet. Bras.*, 2010, 30, 267-276.
11. HONSHO, CS.. MINE, SY; ORIÁ, AP.; BENATO, N.; CAMACHO, AA.; ALESSI, AC.; LAUS, JL.. Generalized systemic cryptococcosis in a dog after immunosuppressive corticotherapy. *Arq. Bras. Med. Vet. Zootec.*, 2003, 55, 155-159.
12. JULIANO, RS.; SOUZA AI.; SCHEIDE R.. Criptococose no sistema nervoso de cães - relato de três casos. *Rev. Pat. Trop.*, 2006, 35, 65-70.
13. KHUDAKARAM-TAFTI, A.; DEGHANI, S. Cutaneous cryptococcosis in a donkey. *Comp. Clin. Pathol.*, 2006, 15, 271-273.
14. KOMMERS, GD.; SOUZA, TM.; SOUTO, MAM.; DE LA CORTE, FD.; BARROS, CSL. Criptococose pulmonar granulomatosa em um equino. *Ciência Rural*, 2005, 35, 938-940.
15. LEMOS, LS.; SANTOS, ASO.; VIEIRA-DAMOTA, O.; TEXEIRA, GN.; CARVALHO, ECQ. Pulmonary cryptococcosis in slaughtered sheep: Anatomopathology and culture. *Vet. Microbiol.*, 2007, 125, 350-354.

- 16.LINDENBERG, ASC.; CHANG, MR.; PANIAGO, AMM.; LAZÉRA, MS.; MONCADA, PMF.; BONFIM, GF.; NOGUEIRA, SA.; WANKE, B. Clinical and epidemiological features of 123 cases of cryptococcosis in Mato Grosso do Sul, Brazil. *Rev. Inst. Med. Trop. S. Paulo*, 2008, 50, 75-78.
- 17.MARCASSO, RA.; SIERRA, S.; VICKY, MB.; BRACARENSE, APFRL.; YAMAMURA, AAM.; BIASI, F.; LOPES, BA.; AMUDE, AM.; CORTÉZ, DEA. Criptococose felina. *Semina: Ciências Agrárias*, 2005, 26, 229-238.
- 18.MONGA, DP.; MOHAPATRA, LN.; KALRA, DS.. Bovine mastitis caused by *Cryptococcus neoformans*. *Indian J. Med. Res.*, 1970, 58, 1203-1205.
- 19.NISHIKAWA, MM.; LAZÉRA, MS.; BARBOSA, GG.; TRILLES, L.; BALASSIANO, BR.; MACEDO, RCL.; BEZERRA, CCF.; PÉREZ, MA.; CARDARELLI, P.; WANKE, B. Serotyping of 467 *Cryptococcus neoformans* isolated from clinical and environmental sources in Brazil: Analysis of host and regional patterns. *J. Clin. Microbiol.*, 2003, 41, 73-77.
- 20.OLIVEIRA, IA. NOBRE, MO.; FERREIRO, L.. Pesquisa de criptococose em cães atendidos no Hospital de Clínicas Veterinárias da UFRGS, Porto Alegre, Brasil. *Acta Scientiae Veterinariae*, 2005, 33, 253-258.
- 21.PAL, M.. Mastitis in a water buffalo (*Bubalus bubalis*) due to *Cryptococcus neoformans* var. *neoformans*. *Rev. Iberoam. Micol.*, 1991, 8, 89-91.
- 22.PAPPALARDO, MCSM.; MELHEM, MSC. Cryptococcosis: a review of the Brazilian experience for the disease. *Rev. Inst. Med. Trop. S. Paulo*, 2003, 45, 299-305.
- 23.PEREIRA, RN.; PEROTIA, JH.; DUNE, ACC.; FERREIRA LIMA, IG.; ALESSI, AC.; CARVALHO, AM.; CANOLA, PA.; CATTELAN, JW.; CANOLA, JC. . Criptococose nasal em ovino: relato de caso. *Arq. Bras. Med. Vet. Zootec.*, 2005, 57, 18 (Abstract).
- 24.PETRITES-MURPHY, MB.; ROBBINS, LA.; DONAHUE, BS.. Equine cryptococcal endometritis and placentitis with neonatal cryptococcal pneumonia. *J. Vet. Diagn. Invest.*, 1966, 8, 383-386.
- 25.RIET-CORREA, F.; DANTAS, AFM.; AZEVEDO, EO.; SIMÕES, SDV.; SILVA, SMS.; VILELA, R.; Mendonza L. Outbreaks of rhinofacial and rhinopahryngeal zygomycosis in sheep in Paraíba, northeastern Brazil. *Pesq.Vet. Bras.*, 2008, 28, 29-35.
- 26.RILEY, CB.; BOLTON, JR.; MILLS, JN., THOMAS, JB... Cryptococcosis in seven horses. *Aust. Vet. J.*, 1992, 69, 135-139.
- 27.ROBERTS, MC.; SUTTON, RH.; LOVELL DKA.. A protracted case of cryptococcal nasal granuloma in a stallion. *Aust. Vet. J.*, 1981, 57, 287-291.
- 28.RODRÍGUEZ, JMT.; MENDOZA, M.; RAMÍREZ, EA.; ROCA, GS.). Cryptococcosis by *Cryptococcus gattii* in immunocompetent goats in Spain and review of the literature. *Acta Scientiae Veterinariae*, 2006, 34, 245-253.
- 29.SANTURIO, JM.; ARGENTA, JS.; SCHWENDLER, SE.; CAVALHEIRO, AS.; PEREIRA, DIB.; ZANETTE, RA.; ALVES, SH.; DUTRA, V.; SILVA, MC.; ARRUDA, LP.; NAKAZATO, L.; COLODEL, EM.. Granulomatous rhinitis associated with *Pythium insidiosum* infection in sheep. *Vet. Rec.*, 2008, 163, 276-277.
- 30.SHNAWA, IMS.; NIGAM, JM. A note on cryptococcal mastitis in sheep. *Indian Vet. Med. J.*, 1987, 7, 175-176.
- 31.SINGH, M.; GUPTA, PP.; RANA, JS.; JAND, SK.. Clinico-pathological studies on experimental cryptococcal mastitis in goats. *Mycopathologia*, 1994, 126, 147-155.
- 32.SILVA, SMMS.; CASTRO, RS.; COSTA, FAL.; VASCONCELOS, AC.; BATISTA, MCS.; RIET-CORREA, F.; CARVALHO EMS.. Conidiobolomycosis in sheep in Brazil. *Vet. Pathol.*, 2007, 44, 314-319.
- 33.STEPHEN, C.; LESTER, S.; BLACK, W.; FYFE, M.; RAVERTY, S.. Multispecies outbreak of cryptococcosis on southern Vancouver Island, British Columbia. *Can. Vet. J.*, 2002, 43, 792-794.
- 34.ZOPPA, ALV.; CRISPIM, R.; SINHORINI, IL.; BENITES, NR.; SILVA, LCLC.; BACCARIN, RYA. Obstrução nasal por granuloma fúngico em eqüino: relato de caso. *Arq. Bras. Med. Vet. Zootec.*, 2008, 60, 315-321.