http://dx.doi.org/10.1590/1678-4162-12771

Arq. Bras. Med. Vet. Zootec., v.75, n.2, p.237-241, 2023

Dirofilaria immitis parasite infection in cats: first case reported in the Legal Amazon region, Brazil – case report

[*Infecção por* Dirofilaria immitis *em gato: primeiro registro na região da Amazônia Legal, Brasil – relato de caso*]

S.A. *Barbosa*, A.V.C.A. *Dourado*, R.M.S. *Nogueira*, L.G.S.M. *Ramos*, J.S. *Moura*, F.B. *Costa*, L.M. *Miranda*, A.P. *Costa**

Universidade Estadual do Maranhão, UEMA, São Luiz, MA, Brasil

ABSTRACT

A case of infection with *Dirofilaria immitis* in a cat is reported here with clinical signs of apathy, anorexia, dyspnea, polypnea, slight dehydration and pale mucus membranes. The radiographic examination showed cardiomegaly, lobar arteries dilation of the cranial lobes and tortuosity, enlargement of the caudal lobar arteries. In the right lobe of the lung parenchyma, interstitial pulmonary opacification tending to alveolar opacification was seen. The clinical signs, the movements, and the morphology of the microfilariae in the direct examination of fresh blood, peripheral blood smear and Knott's modified test supported the diagnosis. We alert to the need for clinicians to consider feline heartworm diseases as a differential diagnosis in endemic areas when cats show respiratory signs.

Key words: heartworm, microfilariae, filaria, dirofilariasis, feline

RESUMO

Descreve-se um caso de infecção por Dirofilaria immitis *em gato com sinais clínicos de apatia, anorexia, dispneia, polipneia, leve desidratação e mucosas pálidas. O exame radiográfico demonstrou cardiomegalia, dilatação da artéria lobar cranial e tortuosidade, alargamento dos lobos caudais da artéria lobar. No lobo direito do parênquima pulmonar, opacificação pulmonar intersticial tendendo à opacificação foi observada. O diagnóstico foi baseado nos sinais clínicos, nos movimentos e na morfologia das microfilárias detectadas no exame de sangue a fresco, no esfregaço de sangue periférico e no teste de Knott modificado. Alertou-se para a necessidade de os clínicos considerarem a dirofilariose felina como diagnóstico diferencial em áreas endêmicas quando os gatos apresentam sinais respiratórios.*

Palavras-chave: verme do coração, microfilária, filária, dirofilariose, felino

INTRODUCTION

Filariae are a group of parasitic nematodes that belong to the family Onchocercidae and inhabit the circulatory and lymphatic systems of its hosts (Biasato *et al*., 2017). *Dirofilaria immitis* is the causative agent of dirofilariasis. The typical hosts for *D. immitis* are domestic dogs, and transmission of this parasite takes place via species of mosquitoes. Unlike dogs, in cats, few larvae develop into adults (Lee and Atkins, 2010), because most of the immature worms that reach the caudal pulmonary arteries die, leading to a vascular and parenchymal and inflammatory response (Blagburn, 2007).

Although *D. immitis* is more commonly found in canids, it has frequently been detected in many countries as a problem in felids in canine endemic areas (Biasato *et al*., 2017; Pana *et al*., 2020). In Brazil too, there have been some reports in cats (Alberigi *et al*., 2020 Branco *et al*., 2009; Moraes *et al*., 2021; Pereira *et al*., 2018).

Feline heartworm infection can be sub-clinical, but its acute manifestations may be associated

* Corresponding author: andrea.costa@professor.uema.br
Submitted: May 23, 2022. Accepted: November 9, 2022

with the cardiovascular and respiratory systems. The aim of this work was to report on a case of microfilaremia in a cat in São Luis, Maranhão (northeastern region of Brazil) where canine heartworm disease is endemic.

CASE REPORT

A female mixed-breed short-haired cat of indeterminate age was found on a street and was taken for veterinary medical care at the University of Maranhão State in the city of São Luis (44°18′10″ W; 2°31′46″ S).

A clinical examination was conducted, and the following signs were observed: apathy, anorexia, dyspnea, polypnea, slight dehydration and pale mucus membranes. The other physiological parameters were within normal limits.
From the radiographic examination of the animal, heartworm infection was suspected. Therefore, direct examination of fresh blood and Knott's modified test (Newton and Wright, 1956) were done. Afterwards, the sample was examined under an optical microscope at different magnifications (40 and 100X).

The radiographic examination showed notable cardiomegaly with hemosedimentation rate-VHS = 9.7 V, dilation of the cranial lobar arteries and tortuosity. Enlargement of the caudal lobar arteries and loss of its definition were observed. In the right lobe of the lung parenchyma, interstitial pulmonary opacification tending to alveolar opacification was seen. Pulmonary hyperinflation was also observed, with pulmonary area going beyond the last costal arch and flat diaphragm. In the abdomen, loss of abdominal conspicuity could be seen, suggestive of peritoneal effusion (Figure 1 a,b).

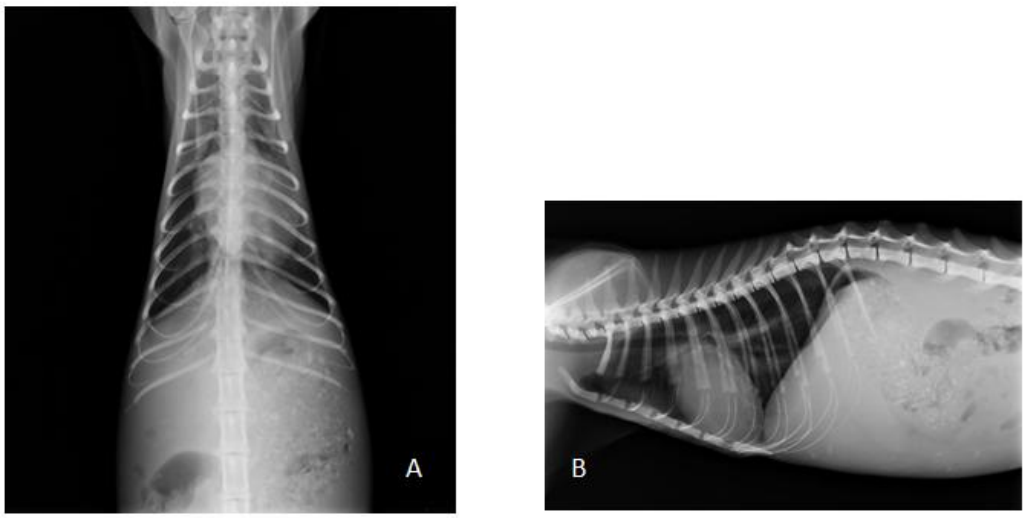

Figure 1. (a) Ventral dorsal view radiography showing cardiomegaly, (b) Lateral view radiography showing pulmonary artery dilatation and pulmonary alveolar pattern.

In the direct examination of fresh blood, microfilariae with serpent-like movements in the blood-cell layer were observed consistent with *D. immitis*, while *Acantocheinolema reconditum* (Syn: *Dipetalonema reconditum*) microfilaria have erratic fast movements. To identify the microfilariae, peripheral blood smear and Knott's modified test, were done and small numbers of microfilariae were detected. Morphological examination showed long and narrow microfilaria with absence of hyaline sheath, a pointed cephalic end and a straight tail with a pointed end (Figure 2 a,b,c). The microfilariae examined in this study had the morphology and movement of *D. immitis* (Ciocan *et al.*, 2010).

Figure 2. (a) Microfilaria of *Dirofilaria immitis*, observed in examination of fresh blood, (b) Peripheral blood smear and (c) The modified Knott technique - 40x

DISCUSSION

In Brazil, there have been reports of feline heartworm disease in the states of Rio de Janeiro and Rio Grande do Norte (Alberigi *et al.* 2020; Branco *et al.*, 2009; Moraes *et al*., 2021; Pereira *et al*., 2018;). Our study provides the first report in the state of Maranhão, Legal Amazon region, thus increasing the known geographical area of feline heartworm disease in Brazil.

The case reported here consisted of feline heartworm infection that was suspected through radiography and clinical signs lead to suspicion of heartworm diseases and confirmed through parasitological tests. According to AHS (Current…, 2020), radiography may provide pieces of evidence of this infection, as seen in the case reported here. The animal died one day after the appointment with the veterinarian and its rescuer did not authorize a necropsy.

Concerning clinical manifestations, the most evident of these were: apathy, anorexia, dyspnea, polypnea, slight dehydration and pale mucus membranes. However, the following manifestations have also been reported in the literature: salivation, intermittent vomiting, lethargy, anorexia, weight loss, respiratory signs (such as coughing, intermittent dyspnea, tachypnea or hemoptysis), tachycardia, collapse, shock, syncope and death due to thromboembolism (Ettinger and Feldman, 2005).

In this study, the thoracic radiograph (lateral and ventrodorsal) revealed alterations suggestive of dirofilariasis. Heart enlargement and right lobar pulmonary arteries dilation are suggestive of dirofilariasis (Biasato *et al*., 2017), and enlargement of the main lobar and peripheral pulmonary arteries is the most consistent lesion in infected cats (Current…, 2020). The ration of the width of the right pulmonary artery and the width of the rib 9 was higher than the reference

values is a sign that strongly suggests the presence of heartworm infection (Lister *et al*., 2005). Hyperinflation is less common (Lister *et al*., 2008), but it was observed in the case reported here.

The diagnosis of feline heartworm disease could be done by the detection of microfilariae in peripheral blood through examination of stained blood smears under a microscope, but this approach has several limitations (Phuakrod *et al.*, 2019). Given that microfilaremia is unusual and may be transient or may present with low parasite loads, false-negative results can occur (Current…, 2020). However, when present, microfilaremia provides a definitive diagnosis (Current…, 2020). Thus, the finding of microfilariae in our study, even in small quantities, allowed us to make a definitive diagnosis.

Sudden death may occur in up to 47% of cats with heartworm (Evans *et al*., 2000), as occurred in our study. According to Lister *et al*. (2008), this has been attributed to circulatory collapse and respiratory failure due to acute pulmonary artery infarction. This acute infarction occurs due to sudden pulmonary thromboembolism, caused by spontaneous death of the adult worm, which can results in an intense intravascular inflammatory reaction (Lister *et al.*, 2008).

On São Luís Island, state of Maranhão, a survey on the prevalence of canine heartworm disease was carried out among dogs from 64 locations, from 1991 to 1994 (Ahid *et al*., 1999). However, since then, the disease has not been reported in the literature. Our finding of a cat with microfilariae raises the hypothesis of lake of clinician acuity in diagnose the disease. However, a large study on dogs would be needed to determine the real prevalence among these animals.

CONCLUSION

In conclusion, we reported here the first diagnosis of feline heartworm disease in the state of Maranhão, Legal Amazon region, Brazil. The presence of microfilaremia in the present case confirms the diagnosis of feline heartworm.

ACKNOWLEDGMENTS

This work was supported by Fundação de Amparo ao Desenvolvimento Científico e Tecnológico do Maranhão/FAPEMA and Coordenação de Aperfeiçoamento Técnico de Pessoal de Nível Superior/CAPES (Finance Code 001).

REFERENCES

AHID, S.M.M.; LOURENÇO-DE-OLIVEIRA, R.; SARAIVA, L.Q. Dirofilariose canina na Ilha de São Luís, Nordeste do Brasil: uma zoonose potencial. *Cad. Saúde Pública*, v.15, p.405-412, 1999.

ALBERIGI, B.; OLIVEIRA, A.C.; VIEIRA, G.S.R. *et al*. Unusual feline *Dirofilaria immitis* infection: a case report. *Rev. Bras. Parasitol. Vet.*, v.29, p.e008420, 2020.

BIASATO, I.; TURSI, M.; ZANET, S. *et al*. Pulmonary artery dissection causing haemothorax in a cat: potential role of *Dirofilaria immitis* infection and literature review. *J. Vet. Cardiol.*, v.19, p.82-87, 2017.

BLAGBURN BL. Feline heartworm disease: solving the puzzle. *Vet. Med*., v.102, Suppl, p.7-14, 2007.

BRANCO, A.B.; MENDES-DE-ALMEIDA, F.; FARIA, M.C.F. *et al*. *Dirofilaria immitis* (Leidy, 1856) in the neighborhood of a feline case: a study about the transmission. *Rev. Bras. Parasitol. Vet.*, v.18, Supl.,1, p.14-18, 2009.

CIOCAN, R.; DĂRĂBUŞ, G.; IGNA, V. Morphometric Study of Microfilariae of *Dirofilaria* spp. on Dogs. *Bull. Univ. Agric. Sci. Vet. Med.*, v.67, p.45-49, 2010.

CURRENT feline guidelines for the prevention, diagnosis, and management of heartworm (*Dirofilaria immitis*) infection in cats. [s.l.]: AHS, 2020. Available in: www.heartwormsociety.org. Accessed in 10 aug, 2022. diagnosis, and treatment. *Top. Comp. Anim. Med*., v.25, 224-230, 2010.

Dirofilaria immitis in the United States. *J. Parasitol*., v.42, p.246-256, 1956.

ETTINGER. S.; FELDMAN, E. *Textbook of veterinary internal medicine* – diseases of the dog and cat. 6.ed. Missouri: Elsevier Saunders; 2005. p.1118-1144.

EVANS, E.A.; LITSTER, A.L.; GUNEW, M.N.M. *et al*. Forty-five cases of feline heartworm in Australia (1999-1998). *Aust. Vet. Pract.*, v.30, p.11-16, 2000.

LEE, A.C.Y., ATKINS, C.E. Understanding feline heartworm infection: disease,

LITSTER, A.; ATKINS, C.; ATWELL, R. Acute death in heartworm-infected cats: Unraveling the puzzle. *Vet. Parasitol.*, v.158, p.196-203, 2008.

LITSTER, A.; ATKINS, C.; ATWELL, R. *et al*. Radiographic cardiac size in cats and dogs with heartworm disease compared with reference values using the vertebral heart scale method: 53 cases. *J. Vet. Cardiol.*, v.7, p.33-40, 2005.

MORAES, M.F.D.; POLLO, A.S.; MARQUES, K.C. *et al*. Report of *Dirofilaria immitis* infection with acute cardiopulmonary complications in a cat from Northeastern Brazil. *Braz. J. Vet. Res. Anim. Sci*., v.58, p.e186835, 2021.

NEWTON, W.L.; WRIGHT, W.H. The occurrence of a dog filariid other than

PANA, D.; RADULESCU, A.; MITREA, I.L. *et al*. First report on clinical feline heartworm (*Dirofilaria immitis*) infection in Romania. *Helminthologia*, v.57, p.49-56, 2020.

PEREIRA, B.B.; BASTOS, B.F.; KEIDEL, L. *et al*. Feline heartworm (*Dirofilaria immitis*) infection: First case report of serological diagnosis in Brazil, confirmed by molecular assay. *An. Acad. Bras. Cienc*., v.90, p.2293-2297, 2018.

PHUAKROD, A.; SRIPUMKHAI, W.; JEAMSAKSIRI, W. *et al*. Diagnosis of feline filariasis assisted by a novel semi-automated microfluidic device in combination with high resolution melting real-time PCR. *Parasit. Vectors*, v.12, p.1-9, 2019.