Case Report

Occurrence of ectopic *Dioctophyma renale* in a Bolivian dog

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**ABSTRACT**

This is the first scientific report of the ectopic occurrence of *Dioctophyma renale* in subcutaneous tissue of a domestic dog’s paw from Bolivia. An 18-month-old male dog (Pug) from Bolivia (San Matías) was examined on September 15, 2020 presenting limited mobility and apparent swelling in the left pelvic limb. After clinical evaluation, left foot edema was observed from tibio-tarsal to metatarsophalangeal joints which was more pronounced on the dorsolateral face. An incision at the site revealed serosanguinous exudation associated with a wide reddish nematode, which was identified as a female *Dioctophyma renale*. Epidemiological considerations were highlighted as this disease has zoonotic potential, and the infected dog was kept in a yard to which amphibians (Anura) and reptiles had access. Moreover, there is a lack of information on its occurrence in San Matías, a border city with Brazil.

1. Introduction

*Dioctophyma renale* is the largest parasitic nematode in wild and domestic animals, commonly known as “the giant kidney worm”, and causes dioctophymosis, a zoonosis (Whelen et al., 2011).

The biological cycle is long (Lemos et al., 2010), indirect, and complex (Anderson, 2000). Adult oviparous worms are located in definitive hosts (DHs) such as dogs, foxes, and others carnivores (Paras et al., 2018), although, cattle, horses, pigs, and cats are parasitized with less intensity. In wild animals, parasitism was observed in coati, ferret, maned wolf, sloth and otter, among others (Vulcani et al., 2015), and in humans (Silveira et al., 2015). Crustaceans, frogs, and freshwater fish are intermediate hosts (IH) for oligoquette annelids (Anderson, 2000), and the paratenic hosts (PH) include frogs and freshwater fish (Pedrassani and Nascimento, 2015). The pre-patent period is approximately six months, although, it is has been reported to be as long as two years (Anderson, 2000).

The adult parasite’s main morphological characteristics are: cylindrical contour (Silveira et al., 2015); large size, reaching 100 cm in length (Pedrassani and Nascimento, 2015), with size variation between hosts; and red coloring (Silveira et al., 2015).

According to Bowman (2013), the parasite is usually found in the right kidney, although it can also be seen in the left kidney, abdominal cavity, subcutaneous tissue, bladder, and rarely in the testicles.

Dogs are the terminal or abnormal DH once the life cycle of *D. renale* is interrupted, as most animals present a single parasitism (Pedrassani and Nascimento, 2015).

The helminth infection is usually asymptomatic, with clinical signs such as lack of appetite, dysuria and renal colic. The lesions due to the infection depend on the parasites location, while its severity depends on the number of parasites, the duration of the infection, location of infection, the number of kidneys infected, and the presence of concomitant kidney disease. There are no reports indicating the mortality rate of an ectopic infection, and in most cases diagnosis thereof can be a surgical or necropsy finding unrelated to death. Additionally, a diagnosis can be made by observing the parasite’s eggs in the urine and the parasites themselves using imaging techniques (Bowman, 2013; Taylor et al., 2015). There is no effective antiparasitic drug for the treatment of dioctophymosis. Thus, surgical removal of the parasite is essential for the recovery of the patient (Perera et al., 2017).

The occurrence of the parasite is rare in some regions and increasing in others, demonstrating the importance of its epidemiology as information about the disease is lacking (Paras et al., 2018). Thus, the objective of the present report is to describe the ectopic localization of *Dioctophyma renale*. 

Keywords: Bolivia, Dioctophymosis, Domestic dog, San Matías
2. Case presentation

An 18-month-old male dog (Pug) was examined on September 15, 2020 in San Matías, Bolivia, a city bordered by Cáceres, Mato Grosso, Brazil, presenting limited mobility and apparent swelling in the left pelvic limb.

The clinical examination revealed edema of the left pelvic limb, from the tibio-tarsal to the metatarsophalangeal joints, with emphasis on its dorsal face. An incision at the site (Fig. 1) revealed serosanguinous exudation associated with a wide reddish nematode, approximately 13 cm, (Fig. 2), which was identified as a female of *D. renale* based on the morphology described by Anderson et al. (2009).

After the parasite was extracted, the incision was sutured and a local bandage was made. Pelvic and abdominal ultrasound and urinalysis tests showed no changes, and the animal was released to return to home. The animal never came back for monitoring; hence, it was not possible to report on the evolution of the infection after surgical treatment nor other sites of parasitism.

3. Discussion

According to Pedrassani and Nascimento (2015), *D. renale* infections can be unique, as in the present case. The increase in the volume of the subcutaneous inguinal region due to the parasite erratic migration was also mentioned by Sousa et al. (2011) and Silveira et al. (2015), different from the present case that was in the paw.

Dioctophymosis in dogs is generally subclinical, as noted in the report, although clinical signs include weakness, difficulty of walking, polyuria, polydipsia, hematuria, kidney pain, anorexia, vomiting, seizures, ascites, abdominal cramps, weight loss, dysuria, progressive weight loss, abortion, and irritability (Silveira et al., 2015).

Giorello et al. (2017) and Pedrassani and Nascimento (2015) have indicated that *D. renale* is potentially lethal when present in both kidneys as it diffusely destroys parenchyma, which results in severe renal failure. In the present report, there were no significant clinical changes as the kidneys were not directly affected by the parasitism of *D. renale*. According to Paras et al. (2018) an infection by *D. renale* is considered ectopic if an adult parasite is recovered outside the kidneys, particularly the right kidney (Silveira et al., 2015). However, there are reports of its presence in the left kidney (Pedrassani and Nascimento, 2015; Silveira et al., 2015), abdominal cavity, subcutaneous tissue, scrotum (Regalin et al., 2016). There are no reports of such distal ectopic occurrence of this parasite in dogs in America (Paras et al., 2018); hence, this unusual description can be mistaken for other conditions.

The dog lived in San Matías, bordered by Cáceres, MT, Brazil, which makes this report particularly important as there are few scientific reports of dioctophymosis in this region. Although Giorello et al. (2017) stated that *D. renale* is globally distributed and common in South America, their study focused on La Plata, Argentina.

Although dioctophymosis has a wide distribution in Brazil, its prevalence differs considerably according to the region evaluated, varying from 0.49% to 30% in Espírito Santo, Goiás, Minas Gerais, Pará, Paraná, Rio Grande do Sul, Rio de Janeiro, Santa Catarina, São Paulo, Amazonas, Pernambuco, and Bahia (Pedrassani and Nascimento, 2015). Rocha et al. (2018) highlighted the lack of studies pertaining to the prevalence of *D. renale* and its distribution may be even more extensive. Silveira et al. (2015) noted that the cycle of transmission and perpetuation of the disease appears to be underestimated. Most infections are associated with rural areas where its main reservoirs are wild fauna, although domestic animals play a role in the spread of disease, and pet dogs and cats are of primary concern.

Corroborating with previous reports, the infected dog in this case was domiciled, although it had wide access to the residence’s backyard, next to a stream, where amphibians of the Anura order and reptiles have been seen. This is a common occurrence in San Matías, which is the transitional area of Bolivian Chaco and Amazon, considered important means of potential contamination (Silveira et al., 2015; Giorello et al., 2017).

Dioctophymosis can be prevented in humans and animals by not eating raw or undercooked fish and earthworms in endemic areas (Ishizaki et al., 2010). The present study contributes to the prevention and control of the disease in Bolivia and Brazil as it reports its occurrence in this region. However, further studies should be conducted to elucidate the determining factors for infection, the development of the disease in...
dogs, and its zoonotic potential.

4. Conclusion

Ectopic parasitism by *D. renale* was reported in in the subcutaneous tissue of the left foot of a San Matias dog inhabiting a yard accessed by amphibians and reptiles. Due to the scarcity of scientific literature, the complex cycle of the parasite, and the unprecedented nature of the report in this region bordering Brazil, further studies are required to understand its zoonotic behavior and elucidate effective control strategies. This is the first report of ectopic parasitism by *D. renale* in a dog in Bolivia.

Ethical statement

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No conflicts of interest are declared.

References