

Utilizing echocardiography to monitor heartworm treatment with melarsomine: A clinical evaluation in a dog

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ABSTRACT: Dirofilariasis is a parasitic disease caused by nematodes in the blood vessels and heart. Echocardiography serves as a diagnostic test to confirm the presence of these worms and assists in staging the disease to determine an appropriate treatment protocol. This case study explored the monitoring of dirofilariasis therapy using cardiac ultrasonography. The results from the case study showed that no adult worms were detectable within the cardiac chambers 19 days after melarsomine treatment, highlighting the efficacy of this therapeutic approach in resolving heartworm infections.

Keywords: dirofilariasis, dog, echocardiography, melarsomine, heartworm treatment

INTRODUCTION

Dirofilariasis, commonly known as heartworm disease, is a significant health concern in dogs and a zoonotic disease that can be transmitted to humans through mosquito bites. This condition is caused by *Dirofilaria immitis* (*D. immitis*), a nematode worm in the pulmonary artery, right ventricle of the heart, anterior eye chamber, and peritoneal cavity (Levine 1990). Studies by Lee *et al.* (2000) and Alia *et al.* (2013) have reinforced the understanding that this disease can be transmitted to humans through the same vectors that affect animals.

The prevalence of *D. immitis* infection in adult dogs found in the heart was 14.6%, whereas that in the peripheral blood reached 7.9% (Erawan *et al.* 2017). Although dirofilariasis is typically diagnosed through blood antigen testing using commercial diagnostic kits (Erawan *et al.* 2015), reports of imaging of adult worms within the heart are rare in Indonesia.

In clinical practice, echocardiography is the primary diagnostic method used to confirm the presence of worms in the heart. It also serves as a screening tool for staging and confirming the location of adult worms, which is crucial for determining an appropriate treatment protocol (Romano *et al.* 2020). This case report aimed to provide detailed documentation of the diagnostic process and monitoring of worm development in the heart using ultrasonography before and after treatment intervention, offering in-depth insights into managing dirofilariasis in a clinical setting.

CASE

Signalment and Clinical History: Basta, a male dog referred by Dr. Ahmad from Ujung Genteng, presented at our facility with a concerning decline in health despite previous interventions for Chronic Kidney Disease (CKD). Notably, Basta exhibited persistent epistaxis and ocular discharge

upon examination, complicating his clinical picture. **Clinical Examination and Diagnostics:** Basta underwent a detailed clinical evaluation, which included haematological and biochemical profiling and revealed anaemia (Figure 1). A blood parasite test confirmed *D. immitis* infection. Cardiovascular examinations showed hypertension (173/111 mmHg, heart rate 150 bpm) and possible cardiac tamponade, supported by echocardiography findings of adult heartworms in the heart. Knott's test also detected microfilariae, highlighting the severity of the infection. **Diagnosis:** The integration of clinical signs with diagnostic imaging and laboratory results led to a definitive diagnosis of dirofilariasis, manifesting severe systemic and cardiac implications for Basta. **Treatment:** Management strategies

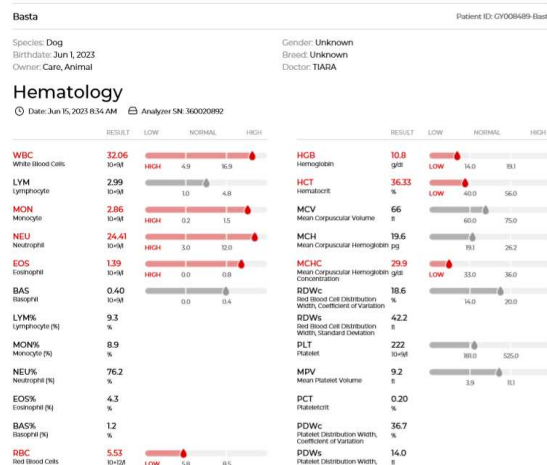


Figure 1. Hematological results for Basta indicating anemia

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for Basta were multifaceted, addressing both the parasitic infection and its secondary complications. The treatment protocol has been streamlined into several key components:

- **Pharmacological Management:** A regimen of moxidectin, imidacloprid, doxycycline, prednisone, enalapril, Si Wu Tang, and Samylin®.
- **Supportive Care:** Intravenous NaCl with tranexamic acid and managed epistaxis with cold compresses.
- **Interventional Procedures:** Diuretics and thoracocentesis addressed ascites, and pleural effusion was observed on day four.
- **Targeted Therapy:** Melarsomine injections targeting adult heartworms.
- **Ocular Treatment:** Ofloxacin eye drops were administered with ocular discharge.

■ RESULTS AND DISCUSSION

Ultrasound monitoring of Basta, a dog diagnosed with dirofilariasis, provides compelling insights into the efficacy of the treatment regimen. Initial ultrasound, conducted on the first day of diagnostic assessment, revealed the presence of fluid in the thoracic cavity and worms within the lumen of the left ventricle and atrium (Figure 2A).

A follow-up ultrasound two days later showed the formation of worms extending from the left ventricle towards the aorta (Figure 2B), highlighting the progressive nature of the disease and the worms' potential impact on cardiovascular function. Causative treatment with melarsomine was initiated on the fourth day after the initial diagnosis. This treatment aims to eradicate adult heartworms in dogs as a critical step, given their location and the associated risks to cardiac health. One week after melarsomine was administered, a subsequent ultrasound on day eleven still showed remnants of worm formation in the right ventricle (Figure 2C). This observation suggests a partial response to the treatment, indicating the persistence of some adult worms despite therapeutic efforts.

However, the final ultrasound on day 19 marked a significant turning point in Basta's recovery. This scan revealed no detectable adult worms within the cardiac chambers (Figure 2D). The disappearance of the worms 15 days post-treatment with melarsomine demonstrated the effectiveness of the treatment, offering a hopeful prognosis for Basta's return to health. These ultrasound results not only chart the course of Basta's recovery, but also highlight the challenges and eventual success of managing dirofilariasis with targeted pharmacological intervention. This case illustrates the importance of timely and appropriate treatment for managing heartworm disease, which can have severe implications for canine cardiovascular health. Progressive imaging provides critical feedback that informs the ongoing management strategy, ultimately leading to a positive outcome.

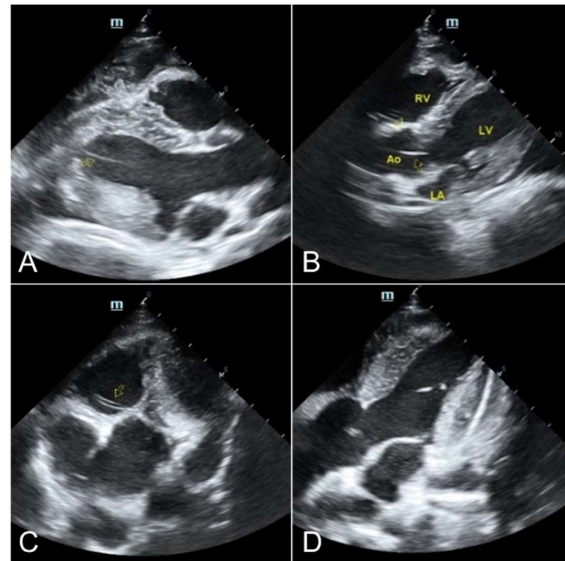


Figure 2. Echocardiography of dirofilariasis in a dog. (A) Ultrasound on Day 1 showed worms in the left ventricle and atrium. (B) Ultrasound on Day 3 depicting worm formations extending from the left ventricle toward the aorta. (C) Ultrasound on Day 12 still shows worm formations in the right ventricle. (D) Ultrasound on Day 19 with no adult worms detected within the cardiac chambers.

■ CONCLUSION

The case of Basta demonstrated that ultrasound imaging is crucial for monitoring the efficacy of melarsomine in treating heartworms, with no adult worms detectable 19 days after treatment initiation. This approach highlights the essential role of ultrasound in evaluating the immediate effect of treatments and verifying their success in managing dirofilariasis.

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