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Fatal Aortic Aneurysm rupture secondary to Spirocerosis – a case report

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Abstract

Canine spirocercosis, caused by the nematode *Spirocerca lupi*, is a clinically significant parasitic disease of carnivores in tropical and subtropical regions. This report describes a fatal case of aortic aneurysm rupture in a four-year-old non-descript dog presenting with exercise intolerance. Post-mortem examination revealed hemothorax, pale mucous membranes, and aortic aneurysm with rupture containing adult worms. Histopathological examination of the aorta demonstrated worm-filled tunnels, extensive necrosis, inflammatory infiltration, and fibrosis. Death was attributed to hypovolemic shock secondary to *S. lupi*-induced vascular deterioration. This case highlights the importance of early diagnosis in endemic areas.

Keywords: Spirocercosis, aortic aneurysm, aortic rupture, hemothorax

Introduction

Infection with the nematode Spirocerca lupi gives rise to spirocercosis, a clinically significant parasitic disease of carnivores widely distributed across tropical and subtropical regions worldwide (Bailey, 1972). The disease progresses through a complex life cycle involving intermediate coprophagous beetles and various paratenic hosts including birds, reptiles, and small mammals (Fincher *et al.,* 1970).

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Epidemiologically, *S. lupi* demonstrates higher incidence in stray, urban, adult, large breed, and hunting dogs compared to household pets (Aroch *et al.,* 2015; Chikweto *et al*., 2012). In India, necropsy studies have indicated prevalence rates of approximately 23.5% (Ramachandran *et al.,* 1984). The clinical manifestations range from subclinical presentations to severe life-threatening conditions including esophageal granulomas, aortic aneurysms, thoracic vertebral spondylitis, and neoplastic transformation (van der Merwe *et al.,* 2008).

Aortic involvement occurs during larval migration through the aortic wall, causing direct tissue damage, inflammation, and subsequent scarring that may lead to aneurysm formation. Rupture of these aneurysms results in catastrophic hemorrhage (Gal *et al.,* 2005; Ivoghli, 1977). This case report documents the post-mortem and histopathological findings of fatal aortic rupture secondary to spirocercosis.

Materials and Methods

A four-year-old non-descript dog carcass was presented to the Department of Veterinary Pathology, School of Veterinary and Animal Sciences, Centurion University of Technology and Management, Paralakhemundi, Odisha for post-mortem examination following sudden death. History revealed that the dog had exhibited exercise intolerance for several months prior to death.

A thorough systematic post-mortem examination was conducted following standard necropsy protocols. Gross lesions were documented and photographed. Tissue samples from the aorta were fixed in 10% neutral buffered formalin, processed routinely, embedded in paraffin, sectioned at 4–5 µm, and stained using hematoxylin and eosin (H&E) for histopathological evaluation (Suvarna *et al.,* 2019).

Results and Discussion

Gross Pathology Findings

The overall condition of the carcass was fair, with rigor mortis fully established. Marked pallor of the conjunctival and buccal mucous membranes (Figs. 1 and 2) was evident, suggestive of severe anaemia. Upon opening the thoracic cavity, a large blood clot (hemothorax) was immediately evident, confirming significant intrathoracic haemorrhage (Fig. 3). The heart appeared markedly pale, consistent with acute blood loss and hypovolaemia.

Characteristic lesions were identified in the aorta, representing the most significant pathological findings. The vessel exhibited a distinct aneurysm with an obvious rupture site. Examination of the affected area revealed extensive haemorrhage, tissue necrosis, and the presence of adult worms, definitively confirming parasitic involvement as the underlying cause of the vascular damage (Fig. 4). The lungs were collapsed, a direct consequence of compression by the haemothorax. All other visceral organs displayed generalised pallor, reflecting the systemic impact of severe blood loss and compromised tissue perfusion.

Histopathological Findings

Histopathological examination of the aorta revealed severe disruption of normal vascular architecture. Cross-sections of adult *S. lupi* (Fig. 5) were observed within the tunica media and tunica adventitia, associated with areas of tissue necrosis and marked inflammatory infiltration predominantly composed of neutrophils and lymphocytes. Aortic wall showed disruption and thinning of the tunica intima with multiple cross-sections of *S. lupi,* embedded within the surrounding connective tissue stroma showing varying degrees of fibrosis and inflammatory cell infiltration (Fig. 6).

Discussion

This case exemplifies the catastrophic potential of canine spirocercosis when involving the thoracic aorta. The sudden death observed was directly attributable to extensive haemorrhage resulting from aortic aneurysm rupture, leading to hypovolaemic shock (Ivoghli, 1977).

Following ingestion of infected intermediate hosts, *S. lupi* larvae penetrate the gastric mucosa and migrate along arterial walls (Soulsby, 1986). During their maturation phase within the thoracic aorta, the larvae cause direct mechanical damage through migration and feeding activities (Fox *et al.,* 1988). This initial injury triggers an acute inflammatory response, which progresses to chronic inflammation with granulomatous-like lesions.

The progressive fibrosis represents the body's attempt to contain the parasitic infection. However, this fibrotic replacement of normal elastic and muscular tissue fundamentally alters the biomechanical properties of the aortic wall. Mineralisation of fibrotic areas further compounds vessel rigidity (Dvir *et al*., 2010). The combination of increased rigidity and zones of weakness creates conditions favouring aneurysm formation and eventual rupture.

The clinical presentation with only exercise intolerance several months before death highlights the diagnostic challenge. This subtle sign may result from reduced cardiac output, decreased vascular compliance, or early cardiac decompensation (Mazaki-Tovi *et al.,* 2002). Spirocercosis should be included in the differential diagnosis for dogs in endemic areas presenting with exercise intolerance, chronic vomiting, weight loss, or unexplained thoracic abnormalities.

Early diagnosis remains challenging. Faecal examination using sugar flotation can detect *S. lupi* eggs, though shedding may be intermittent (Markovics and Medinski, 1996). Advanced imaging including thoracic radiography and computed tomography can identify aortic irregularities and oesophageal masses (Kirberger *et al.,* 2013). Oesophagoscopy allows direct visualisation of oesophageal nodules but provides no information about aortic involvement (Merhavi *et al.*, 2020).

Treatment relies primarily on avermectin anthelmintics, with doramectin showing high efficacy (Lavy *et al.,* 2002). However, efficacy is reduced once advanced aortic pathology develops, as structural damage is largely irreversible. This underscores the critical importance of early diagnosis and treatment before irreversible vascular damage occurs. The pathological findings in this case align with previously reported fatal cases, showing extensive wall damage, aneurysmal dilatation, worm-filled tunnels, and extensive fibrosis (Ivoghli, 1977; Sasani *et al.,* 2014), confirming the well-established pathogenesis of spirocercal aortitis and its progression to fatal rupture.

Conclusion

This case demonstrates the fatal outcome of aortic aneurysm rupture secondary to *Spirocerca lupi* infection. The subtle clinical presentation emphasises the insidious nature of aortic spirocercosis. In endemic regions, veterinary practitioners must maintain high suspicion for spirocercosis even with minimal clinical signs. Early diagnosis through multimodal approaches including faecal examination and thoracic imaging, combined with timely anthelmintic therapy, offers the best chance of preventing fatal complications.

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Fig. 1: Pale buccal mucous membrane

Fig. 2: Pale conjunctival mucous membrane

Fig. 3: Large clotted blood mass was noticed in the thoracic cavity

Fig. 4: An area of granulomatous lesion along with presence of adult round worms noticed in the aorta

Fig. 5: Cross section of adult S. lupi in the wall of aorta (H and E, 400X)

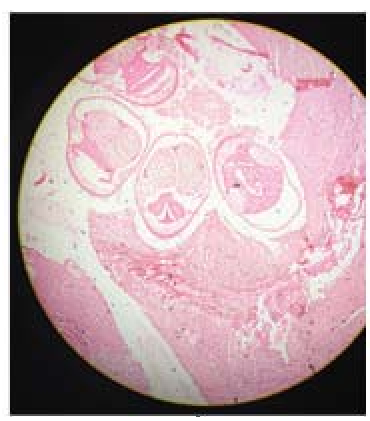

Fig. 6: Aortic wall showed disruption and thinning of the tunica intima with multiple cross-sections of S. lupi, embedded within the surrounding connective tissue stroma showing varying degrees of fibrosis and inflammatory cell infiltration (H and E, 100X).