

SPIROCERCA LUPI ASSOCIATED GRANULOMA IN A STRAY DOG: A CASE REPORT

S. Roshini, G. K. Sawale, G. N. Patil, A. K. Mustare, A. K. Mhase, S. D. Moregaonkar, D. P. Kadam, Rajesh R. Rohi and G. P. Bharkad

Department of Veterinary Pathology, Bombay Veterinary College, Maharashtra Animal & Fishery Sciences University, Parel, Mumbai-12.

Introduction

Spirocercosis is parasitic disease caused due to nematode *Spirocerca lupi* and is worldwide in occurrence. It is endemic in some warm climates. Domestic dogs and other wild carnivores (fox, wolf, coyote and jackal) are most commonly affected, although natural infections have also been reported in domestic and wild felids, man, goats, horses and donkeys. Target organs are the oesophagus and aorta, resulting in gastrointestinal, respiratory and circulatory signs (Oryan *et al.*, 2008). The major epidemiologic factors of the disease include canine population density and environmental conditions (e.g., soil type and pH, temperature, rainfall, solar radiation) that sustain the source of the intermediate hosts (dung beetle) and transport hosts (reptiles, birds, rodents) as stated by Chhabra *et al.*, (1973).

Carnivores are infected by ingestion of beetles or a variety of paratenic hosts including numerous amphibians, reptiles, lizards, domestic and wild birds and small mammals such as hedgehogs, mice and rabbits (Soulsby, 1986). In the definitive host, the larvae usually follow a specific migratory route, reaches to the stomach of the dog and then penetrate the gastric mucosa of the host and begin a predictable migratory route. They migrate along arteries, follow their life cycle in the thoracic aorta and about three months post-infection, the larvae leave the aorta and migrate to the caudal esophagus where they provoke the development of granulomas as they mature to adults over the next three months (Soulsby, 1986 and Urquhart *et al.*, 1996). Here they form granulomatous tumor-like growth in which they reach maturity and reproduce eggs. The eggs are passed via a small opening (or openings) into the esophagus and their cycle repeats itself (Evans, 1983 and Lobetti, 2000).

The clinical manifestations due to spirocercosis vary greatly, depending on the stage of the disease, aberrant migrations and

possible complications. Clinical signs, in endemic areas include vomiting or regurgitation, dysphagia, dyspnoea, pyrexia and anorexia (Bailey, 1972; Jubb *et al.*, 1993 and Lobetti, 2000). Definitive diagnosis is made by detection of typical embryonated eggs in fecal smears, and/or finding the parasite in the granulomatous lesions (Fox *et al.*, 1988). This paper reports the case of oesophageal granuloma caused by *Spirocerca lupi* in a stray dog.

Materials and methods

A One year old female non-descript stray dog was presented for postmortem examination to the Department. The dog showed restlessness before death. Detailed necropsy was conducted and gross lesions were recorded. The affected tissue sample were collected in 10% formalin, processed and embedded in paraffin blocks. Section of 5 μ m were taken on slides and stained with haematoxylin and eosin (Culling, 1963). Intestinal contents and worms from the lesions were collected for parasitological examination.

Result and Discussion

Clinical signs observed before death were restlessness and anorexia. On necropsy, external examination of dog revealed pale mucous membranes, ticks on the body and dehydrated carcass. Grossly, Aorta showed aneurysm and cut section of the aorta revealed red brown colored round worms (Fig. 1). Moreover, oesophageal mucosa showed nodules of about 3x4 cm and cut section of the nodule showed round worms (Fig. 2 and 3). The length of worms varied from 1-4 cm in both, aorta and oesophagus. There were approximately 6-12 numbers of worms in aorta and esophageal nodule. The present findings are in accordance with the observation of various researchers (Fox *et al.*, 1988; Dvir *et al.*, 2001; Moulton, 2002) in which they reported that the most common pathological

lesions of spirocercosis includes aortic scars and aneurysms, and esophageal nodular granulomas.

Moreover, Bailey, (1972) and Chandrasekharan *et al.* (1958) were of the opinion that there are generally three to six worms containing nodules were seen in the

submucosa of the wall of the oesophagus, a few centimetres cranial to the diaphragm. However, the number of worms present in a nodule varies from a few to 30, but there are typically between three to six (Chandrasekharan *et al.* (1958).



Fig. 1: Aorta showing aneurysm

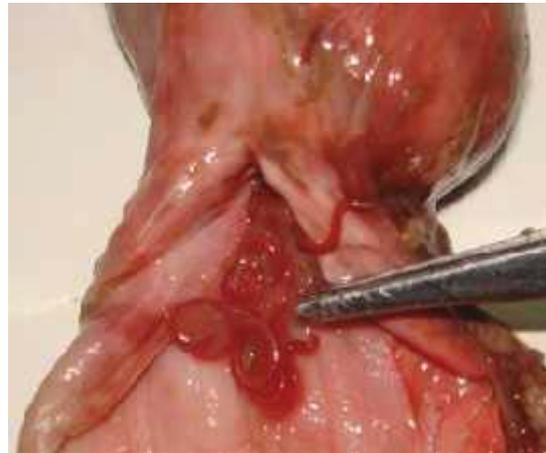


Fig.2: Oesophagus showing nodules along with worms

It is suggested that the pathologic lesions may result from normal or aberrant migration of parasite. In the normal migration route along the gastro-aortic arterial system, the lesions include rupture of the aorta resulting haemothorax and sudden death, or rupture of other major blood vessels, that cause haematomas (Riberio *et al.*, 1994; Dvir *et al.*,

2001;). Migration through the aortic wall to the oesophagus may result in mediastinitis, pneumomediastinum, pleuritis or pyothorax with clinical sign of dyspnea (Stephens *et al.*, 1983; Hamir, 1984; Dvir *et al.*, 2001;). However, we did not observe these lesions in the present study.



Fig. 3: Esophageal nodules containing worms



Fig.5: Thickening of the wall of aorta and aneurysm

Stomach showed hemorrhages on the mucosa and there were streaks of hemorrhages noticed on the intestinal mucosa. Liver was enlarged, congested and cut section showed blood tinged exudates. Kidneys were puffy and capsule peeled off with difficulty. Cortical surface showed white focal areas. Other visceral organs

did not show significant changes. These lesions observed in the present investigation are non specific and could be due to secondary complication.

Histopathological examination of the nodule from oesophagus revealed a typical granulomatous inflammation surrounding the

worm (Fig. 4). Aorta showed aneurysm and thickening of the wall (Fig. 5). Kidneys showed large focal lymphocytic aggregations along with diffuse tubular degeneration of epithelial cells, diffuse hypercellularity of the glomeruli, multifocal interstitial edema and proteinaceous casts in glomeruli. Liver showed diffuse cloudy swelling of the hepatocytes and infiltration of the mono nuclear cells.

Necrosis, haemorrhages and exudation followed by fibrosis, scar formation and sometimes mineralization and aneurysm formation in the aortic and other blood vessels are other usual histopathological findings in canine spirocercosis (Jubb *et al.*, 1993). This may be the reason for aortic aneurysm in this case.

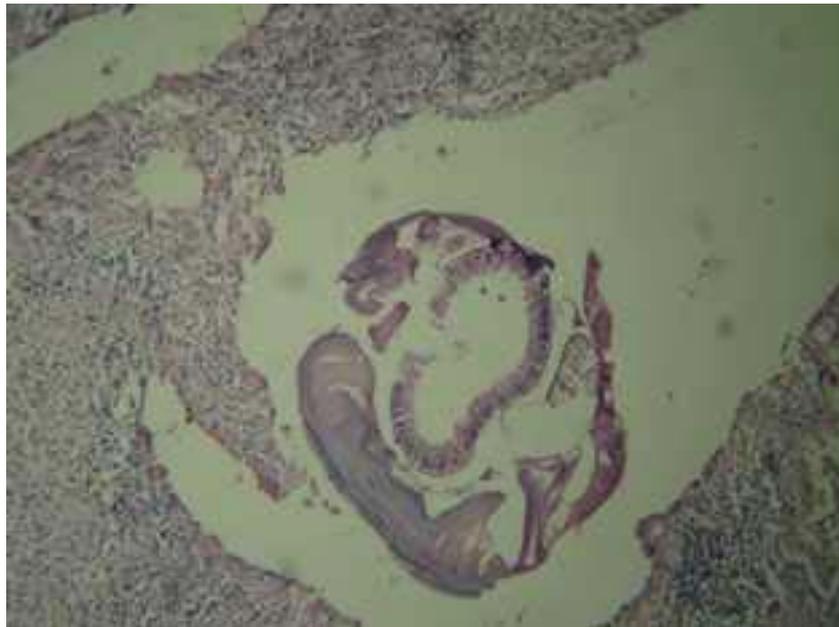


Fig. 4: Granuloma formation around the worm (oesophagus)

Metaplastic ossification of the aorta, to the extent of bone marrow formation, has been reported (Kumar *et al.*, 1981). This is not in agreement with the present study. Aortic lesions are the most common lesion associated with spirocercosis and are considered pathognomonic (Bailey, 1972; Ramachandran *et al.*, 1984).

Summary

Spirocercosis is a serious condition in endemic areas. Clinical signs usually develop late in the disease except in those cases presenting with peracute aortic rupture. Even though there is very good drugs are available for spirocercosis treatment, still there is high prevalence of spirocercosis among stray dogs. This communication is an attempt to record the common gross and histopathological findings of spirocercosis in stray dogs.

References

Bailey, W. S. 1972: *Spirocerca lupi*: a continuing inquiry. Journal of

Parasitology, **58**, 3–22.
 Chandrasekharan K. P, Sastry G. A. and Menon M. N. 1958: Canine Spirocercosis with special reference to the incidence and lesions, The British Veterinary Journal **114**, pp. 388–395.
 Chhabra, R. C., Singh, K. S. 1973: A study on the life cycle of spirocerca lupi, intermediate hosts and their biology, Indian Journal of Animal Science, **43**, 49-54.
 Culling, C. F. A. 1963: Hand book of Histopathological and histochemical techniques. 3rd Edn. Butter Worths and Co. (Publishers), Ltd. Landon. Pp.402-403.
 Dvir, E., Kirberger, R. M., Malleczek, D. 2001: Radiographic and computed tomographic changes and clinical presentation of spirocercosis in the dog. Veterinary Radiology and Ultrasound, **42**, 119–129.
 Evans, L. B. 1983: Clinical diagnosis of *Spirocerca lupi* infestation in dogs. Journal of the South African Veterinary Association, **54**, 189–191.

- Fox, S. M., Burns, J., Hawkins, J. 1988: Spirocercosis in dogs. *Compendium Small Animal*, **10**, 807–822.
- Hamir, A. N. 1984: Perforation of thoracic aorta in a dog associated with *Spirocerca lupi* infection. *Australian Veterinary Journal*, **61** (2), 64.
- Jubb, K.V.F., Kennedy, P. C., Palmer, N. 1993: *Pathology of Domestic Animals*. 4th ed. Vol. 2. Academic Press Inc., Philadelphia, U.S.A. pp: 563-564.
- Kagira, J. M., Kanyari, P. W. N. 2001: Parasitic diseases as causes of mortality in dogs in Kenya: a retrospective study of 351 cases (1984–1998). *Israel Journal of Veterinary Medicine*, **56**, 11–99.
- Kumar, N., Vegad, J. L., Kolte, G. N. 1981: Note on an unusual case of spirocerca granuloma in the stomach of a dog. *Indian Journal of Animal Science*, **51**, 805–806.
- Lobetti, R. G. 2000: Survey of the incidence, diagnosis, clinical manifestations and treatment of *Spirocerca lupi* in South Africa. *Journal of the South African Veterinary Association*, **71**, 43–46.
- Moulton, J. E. 2002: Tumors of the alimentary tract, in the dog. In: Moulton J.E. (ed.): *Tumors in Domestic Animals*. 4th ed. Iowa State Press, Iowa. 310 and 441–443.
- Oryan, A., Sadjadi, S. M., Mehrabani, D., Mehrabani, D., Kargar, M. 2008: Spirocercosis and its complications in stray dogs in Shiraz, southern Iran. *Veterinarni Medicina*, **53**(11), 617-624.
- Ramachandran, P. V., Shakir, S. A., Ramakrishnan, R. 1984: Spirocercosis in canines – a necropsy survey. *Cheiron Tamil Nadu Journal of Veterinary Science and animal Husbandry*, **13**, 132–135.
- Riberio, V. M., Lima, W. S., Toledo Jr, J. C. 1994: Sudden death of a bitch due to rupture of thoracic aorta associated with *Spirocerca lupi* infection. *Arquivo Brasileiro de Medicina Veterinaria Zootecnia*, **46**, 185–186.
- Soulsby, E. J. L. 1986: *Helminths, arthropods and protozoa of domestic animals*. Baillier Tindall, London, UK. pp: 291–294.
- Stephens, L. C., Gleiser, C. A., Jardine, J. H. 1983: Primary pulmonary fibrosarcoma associated with *Spirocerca lupi* infection in a dog with hypertrophic pulmonary osteopathy. *Journal of American Veterinary Medical Association*, **182**, 496–498.
- Urquhart, G. M., Amour, J., Duncan, J. L., Jennings, F. W., Dunn, A. M. 1996: *Spirocerca*. In: Urquhart, G. M., Amour, J., Duncan J. L., Jennings, F. W., Dunn, A. M. (eds.): *Veterinary Parasitology*. Blackwell Science, Glasgow. 79–81.
