

Pathology of *Spirocerca lupi* associated oesophageal fibrosarcoma in a dog: A case report

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ABSTRACT

Spirocerca lupi is associated with the formation of sarcomas in the oesophagus of canines. A nine-year-old male Labrador carcass was presented for postmortem examination. The necropsy revealed gelatinization of subcutaneous fat and rounded up heart with gelatinization of epicardial fat. The liver was slightly enlarged, mottled in appearance with rounded borders. Kidney showed pitted up appearance on cortex. The prostate showed moderate enlargement. A nodule measuring about 5 × 4 cm in size was observed on the distal oesophagus just proximal to gastric cardia. On incision of nodule, a reddish worm was extracted. Histopathological examination of the nodule revealed spindle to plump cells arranged in intertwining whorls with little amount of collagen. Degeneration and necrosis of hepatocytes were observed around the central veins whereas cells around portal triads showing mild fatty changes. Kidney revealed mononuclear cell infiltration in the interstitium along with mild fibrosis. Intestinal mucosa revealed patches of hemorrhages, mucosal necrosis and mononuclear cell infiltration in the sub mucosa. Glandular epithelium of prostate showed papillary like projections into the lumen. Based on gross and histopathological examination, the case was diagnosed as *Spirocerca lupi* induced oesophageal fibrosarcoma.

Keywords: Dog, fibrosarcoma, oesophagus, *Spirocerca lupi*

Spirocercosis presents a significant risk as a parasitic ailment affecting both domestic and wild canines and felines caused by the spirurid nematode *Spirocerca lupi*. Although the disease is found worldwide, its highest prevalence is reported in tropical and subtropical regions¹. Dung beetles or coprophagous beetles, serve as intermediate hosts. Additionally, lizards, snakes, frogs, birds, rodents and rabbits may also act as paratenic hosts for the parasite². Spirocercosis often associated with scarring and aneurysm of the aorta, spondylitis of the thoracic vertebrae, also *Spirocerca lupi*, inhabits the esophageal wall of hosts results in the formation of sizable, thick walled, cystic granulomas in the submucosa of the caudal oesophagus³ and may prompt malignant alterations in the oesophageal wall, characterized by the development of mesenchymal neoplasms such as fibrosarcoma and osteosarcoma⁴. The present communication reports a fatal case of *Spirocerca lupi* induced oesophageal fibrosarcoma and associated pathological changes in a dog.

A nine-year-old male Labrador carcass was presented for postmortem examination with the history of lateral recumbency for past two weeks. The complete necropsy was carried out and samples were collected in 10% neutral buffered formalin for histopathological examination. Nematodes were extracted from the cavity of the nodule in the oesophagus and preserved in 70% alcohol for identification and confirmation. The formalin-fixed tissue samples being cut into thin sections (4 microns) and placed on glass slides. These slides were then stained with Haematoxylin and Eosin (H&E).

External examination revealed shrunken eyeballs with pale mucous membrane and edema in both hind limbs. The internal examination revealed gelatinization of subcutaneous fat. Serous fluid of about 1 liter and 200 ml was noticed in the abdominal cavity and pericardial sac respectively. A nodule measuring about 5×4 cm in size was observed on the distal oesophagus just proximal to

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gastric cardia (Fig. 1). The nodule was hard to cut and a reddish coiled worm was extracted. Heart showed rounded appearance with gelatinization of epicardial fat along with thinning of left ventricular wall. The kidneys appeared shrunken and the capsule peeled off with difficulty, revealing a pitted cortex (Fig. 2). Lungs were leathery in appearance and slightly hard in consistency. The liver was slightly enlarged, mottled in appearance with rounded borders. The intestinal lumen contained mucoid contents and the mucosa revealed diffuse haemorrhages with numerous tiny round worms. Multiple

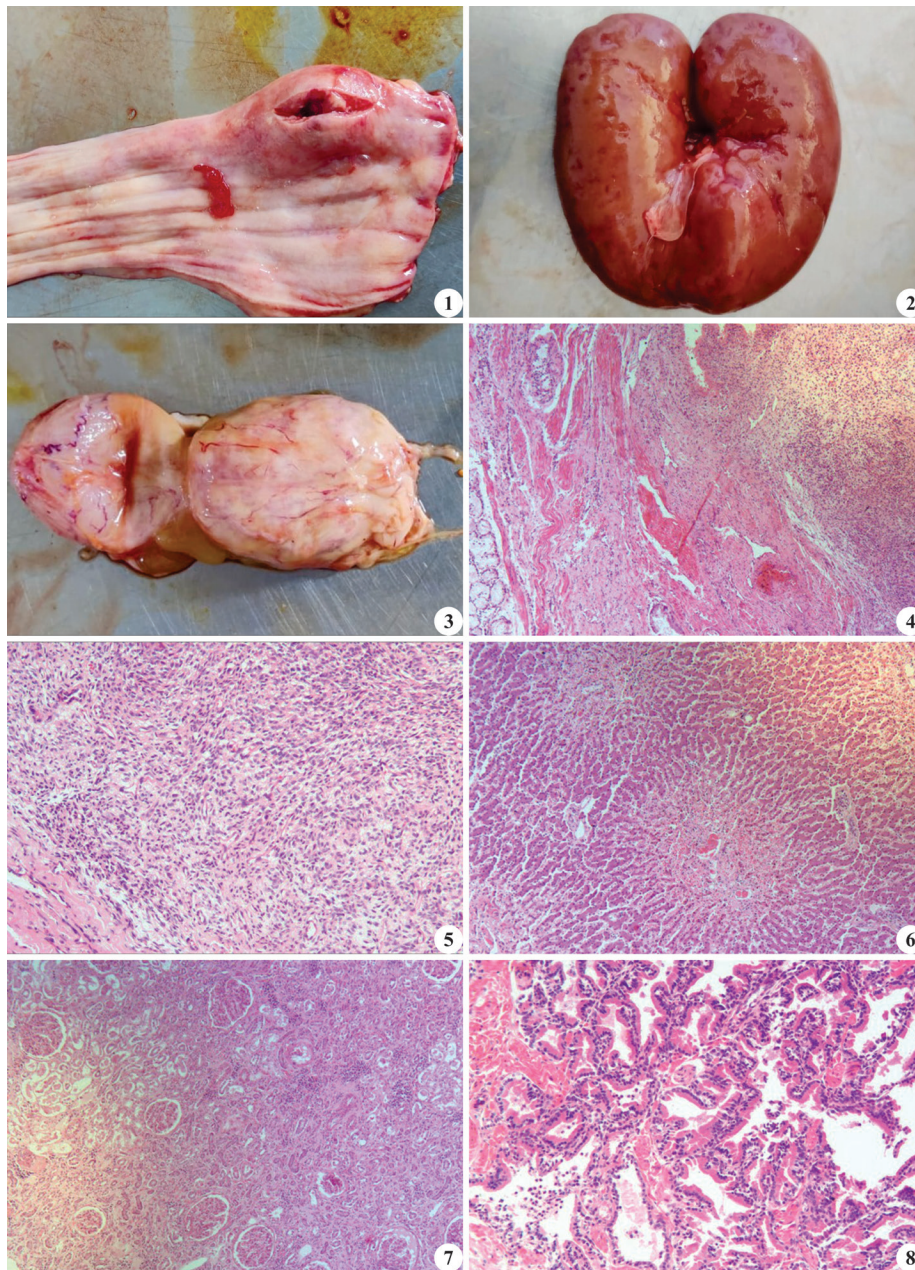


Fig. 1. Oesophagus - Nodule in distal oesophagus just proximal to gastric cardia and a mature *S. lupi* on the mucosa; **Fig. 2.** Kidney showing pitted up appearance in the sub capsular area; **Fig. 3.** Prostate showing moderate enlargement; **Fig. 4.** Fibrosarcoma - Exophytic tumour mass raised from the mucosa of oesophagus (H&E x40); **Fig. 5.** Fibrosarcoma showing haphazardly arranged spindle shaped cells with plumpy nucleus (H&E x100); **Fig. 6.** Liver - CVC - Nutmeg pattern (H&E x40); **Fig. 7.** Kidney revealed interstitial fibrosis with MNC infiltration (H&E x40); **Fig. 8.** Prostate - Hyperplastic epithelium thrown into papillary folds (H&E x100).

ulcers were observed on thickened intestinal mucosa. The urinary bladder was empty, the lumen contained brownish calculi and the mucosa showed severe congestion. The prostate showed moderate enlargement (Fig. 3).

Parasitological examination revealed a reddish pink, coiled female *Spirocerca lupi* measuring about 5.1 cm in length. The worm had six lips with hexagonal mouth and a dorsally curved tail end.

Histopathology of the oesophagus revealed a well capsulated tumour mass raised from the mucosa (Fig. 4). The tumour mass composed of haphazardly arranged spindle shaped cells. The neoplastic cells contained plumpy elongate nucleus with prominent nucleolus (Fig. 5). Considerable anisocytosis and anisokaryosis were observed in the tumour cell population. Few areas showed metaplasia of fibrous tissue into osteoid tissue. Left ventricle, muscle fibers were small and contained more closely placed nucleus which indicates

the atrophy of the cardiac muscle fibers. This might be due to continuous pressure on the aorta which prevents the complete emptying of left ventricle during systole, as a result the stasis of blood occurs in the left ventricles leading to chronic venous congestion that leads to compensatory heart failure, which is evident by the characteristic nutmeg pattern in the liver. The hepatocytes around the central vein showed degeneration and necrosis with more number of RBCs, where as the hepatocytes around the portal triad showed mild fatty changes (Fig. 6). Bile duct hyperplasia was seen in few areas. Lung revealed edema fluid accumulation in the alveoli and inter alveolar space. Kidney showed chronic interstitial nephritis, characterized by fibrous tissue proliferation in the severely affected areas, small glomeruli and plasma cell infiltration in the interstitium (Fig. 7). Patchy areas of necrosis and haemorrhages were observed on the intestinal mucosa. The submucosa was infiltrated with mononuclear cells. The hyperplastic prostate epithelium was thrown into folds and papillary projections into the lumen (Fig. 8). The epithelium was lined by tall columnar cells with centrally placed nucleus.

The diagnosis of spirocercosis is still challenging due to many factors like small or atypically located nodules, presenting the case early disease stages, differentiating the *S. lupi* induced benign nodule and a neoplastic tumour. Atypical cases or aberrant migration are also diagnostically challenging⁵. Computed tomography (CT) is a particularly useful method for diagnosing tiny intraluminal, mural and extraluminal nodules, abnormally positioned nodules, and dystrophic aortic mineralization⁶. However, CT examination is still not affordable in all developing countries. Ultrasonography is not an effective diagnostic tool for spirocercosis in dogs but the lesions like vascular wall irregularity and thickening in the abdominal aorta or celiac artery might be due to migration of *S. lupi*. Therefore, clinical diagnosis of spirocercosis mostly depends on thoracic radiography, which shows a caudodorsal mediastinal mass, caudal thoracic vertebral spondylitis and aortic undulation from aneurysm formation⁷.

In general, postmortem examination reveals the nodules in the oesophagus and other lesions in the aorta. The caudal oesophageal mass and aortic aneurysms are considered to be a pathognomonic to spirocercosis⁸. In the present case, we found a nodule in the oesophagus but there was no aneurysm in the aorta. Most of the time the spirocercosis is subclinical and produce the considerable lesions in the oesophagus including granulomas, sarcomas and other lesions are aortic aneurysms, thoracic discospondylitis or spondylosis, hypertrophic osteopathy⁹ and salivary gland necrosis have been occasionally reported¹⁰. The oesophageal neoplasia is extremely rare where the spirocercosis does not exist, so

spirocercosis is the major cause of oesophageal neoplasia in the dog¹¹ and therefore this is considered as a potential natural model for carcinogenesis study¹². The nodule in the present case was firm in consistency, thick fibrotic wall; cavity contained a single worm and little quantity of yellow pus¹³. Generally the presence of helminthes leads to formation of high substitution rate granulomas, which were characterized by the presence of macrophages with mitotic division, epithelioid cells, giant cells, lymphocytes and fibrous tissue¹³. But in the present case, there was no granuloma however we observed highly cellular fibrosarcoma with few metaplastic changes.

Spondylitis of the thoracic vertebrae is considerably constant in spirocercosis¹⁴ but in the present study this was the incidental finding during the postmortem examination. Radiographic results were not available to confirm the thoracic spondylitis. Other lesions reported in spirocercosis include pulmonary edema, atelectasis and pneumonia, hyperemia and fatty changes in liver, interstitial nephritis and adhesive cystitis^{12,15}. In the present case we observed the pulmonary edema, nutmeg pattern in liver, chronic nephritis, uroliths, chronic enteritis and prostate hyperplasia. These lesions might be associated with other diseases. Even in the modern era of diagnostic facility, early diagnosis of infection is still a challenge.

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