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## Sarcocysts as a common post mortem finding in heart muscles of cattle: Necropsy case report

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### Abstract

A necropsy case of the Vrindavani breed of cattle was presented in the post-mortem hall of the Division of Pathology in ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly (Uttar Pradesh). One of the prominent necropsy findings was the presence of Sarcocysts in cardiac muscles revealed after a microscopic examination of tissue section collected from the myocardium. Micrograph through the cardiac muscle section of a carcass showing eosinophilic myositis and exhibiting diffuse leukocytic infiltration and the *S. cruzi* like sporocyst with multifocal sarcocystosis schizonts within cardiac muscle fascicles with congested blood vessels and also sarcocyst was evident in Purkinje fibers. By light microscopy, it can be distinguished whether the wall is thick or thin. Cysts containing bradyzoite in striated cardiac muscles and liberation of infective bradyzoites from cysts were observed. Macroscopic findings were congested myocardium with multifocal petechiae at the apex, interventricular groove and epicardial fat deposits were observed, other prominent gross findings were an enlarged liver, with mild congestion seen on a cut section and thickened hepatic capsule and cut section of liver showing congested parenchyma with pale grey areas of necrosis. Microscopic examination confirmed a focal area of necrosis infiltrated with numerous Polymorphonuclear Lymphocytes (PMNLs) in liver tissue and also dilated sinusoids infiltrated with neutrophils and cells with intense eosinophilic cytoplasm were observed.

**Keywords:** Bradyzoites, eosinophilic myositis, necropsy, sarcocystosis, schizonts, Vrindavani

### Introduction

#### Background

*Sarcocystis* (Derived from the Greek word: *Sarkos* means flesh and *Kystis* means cyst), belongs to the family Sarcocystidae. *Sarcocystis* species are unicellular parasites that belong to cystogenic coccidia (Apicomplexa: Sarcocystidae). Members of this family are tissue cyst forming coccidia. They are heterogeneous parasites. The sexual stage is found in the final host and the asexual stage is found in intermediate hosts. During their life cycle, they require both an intermediate and a final host, the former usually a herbivorous and the latter a carnivorous vertebrate animal. Cattle are long-known intermediate hosts of *S. Cruz*, *S. hirsuta* and *S. hominin*, with canids, felids and humans as final hosts, respectively (Dubey and Lindsay, 2006) [1]. *Sarcocystis cruzi* is the most pathogenic and most prevalent of all bovine sarcocysts, with canids as its definitive hosts; it is not transmissible to humans (Dubey *et al.*, 2016) [3]. Sarcocysts are found in virtually all striated muscles of the body including the tongue, esophagus and diaphragm as well as cardiac muscle and, to a lesser extent, smooth muscle. *Sarcocystis* is generally asymptomatic but can cause mild gastro-intestinal signs such as diarrhea in cattle. *Sarcocystis* species infections are quite prevalent in farm animals (higher than 70% in some herbivore populations); however, there have been few outbreaks of clinical disease. Most animals are asymptomatic, and the tissue cysts (chronic stage) are discovered only at slaughter. *Sarcocystis* species infections are probably most important in growing ruminants in which they can result in subclinical anemia and reduced weight gain. Clinical signs such as Anorexia and fever are also encountered in some cases. Cases of necrotic encephalitis and fatal myocarditis in heifers have also been reported (Dubey *et al.*, 2016) [3].

Pathologic changes in myocardium and skeletal muscles were more pronounced in cows with lymphatic leukemia (Dubey *et al.*, 2015) [2].

**Case presentation**

One-year-old heifer of Vrindavani breed from Cattle & Buffalo farm under Livestock Production and Management

division, IVRI was presented for post mortem with a brief history of diarrhea, anorexia and ruminal tympany, lack of response to treatment and a 3-day history of anorexia. The cow was in poor general health and carcass condition was bloated (Fig.1). Rigor Mortis was present in both hind limbs and forelimbs and the conjunctival mucus membrane was slightly pale Fig.1).



**Fig 1:** Bloated condition of the carcass and pale conjunctival mucus membrane

**Results**

**Gross findings:** There were numerous haemorrhages on the surface of the viscera (Fig. 2a). Moderate congestion and uncollapsed pulmonary lobes with thickened interlobular septa were observed (Fig. 2b) Diffused petechial haemorrhages over tracheal and bronchial mucosa were observed (Fig. 2c). Gross examination of heart revealed congested myocardium with multifocal petechiae at the apex, interventricular groove and on epicardial fat deposit (Fig.3). Other prominent gross findings were enlarged liver with mild

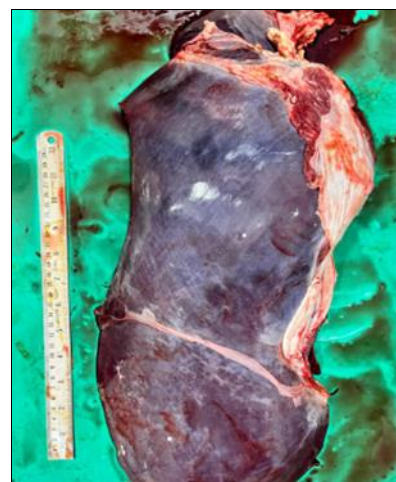
congestion seen on cut section and thickened hepatic capsule (Fig.4) and cut section of liver showing congested parenchyma with pale grey areas of necrosis (Fig.5a and b). Intestinal segments filled with watery blood-tinged diarrhoeic contents. A segment of colon with congested, corrugated mucosa with mucoid exudate (Fig. 6a) and severe transverse corrugations of intestinal mucosa of jejunum with multifocal irregular to elliptical raised mucosal thickenings were observed (Fig.6b & c).



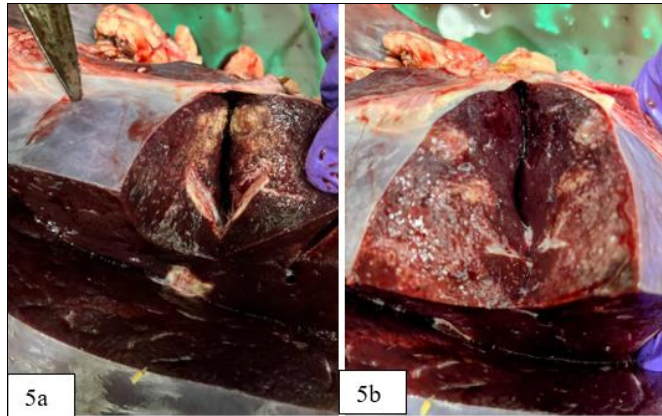
**Fig 2:** Mild to moderate congestion and uncollapsed pulmonary lobes with thickened interlobular septa and diffused petechial haemorrhages over tracheal and bronchial mucosa.



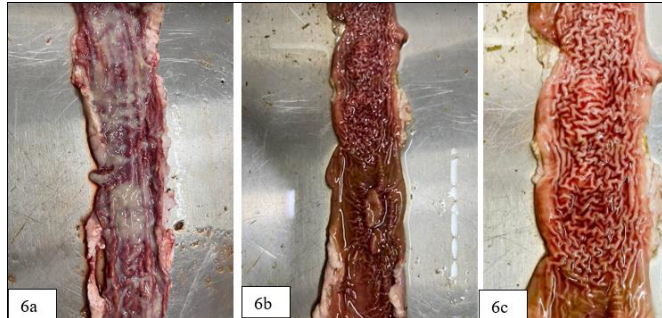
**Fig 3:** Congested myocardium with multifocal petechiae at the apex, interventricular groove and epicardial fat deposit



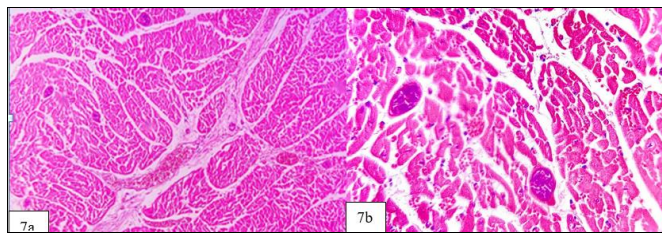
**Fig 4:** Enlarged liver with mild congestion seen on cut section and thickened hepatic capsule



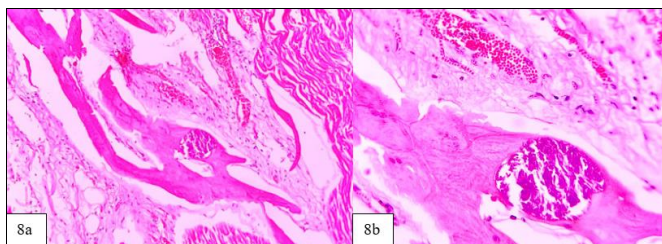
**Fig 5a, b:** Cut section of liver showing congested parenchyma with pale grey areas of necrosis.



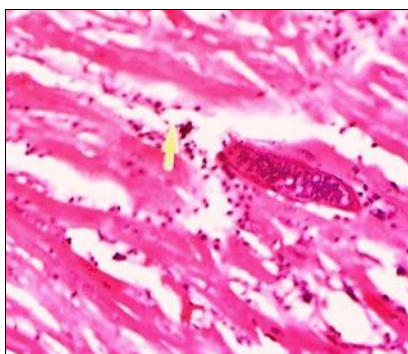
**Fig 6:** Large intestinal segment (Colon) showing congested and corrugated mucosa with mucoid exudate (a). Severe transverse corrugations of intestinal mucosa of jejunum with multifocal irregular to elliptical raised mucosal thickenings (b &c).



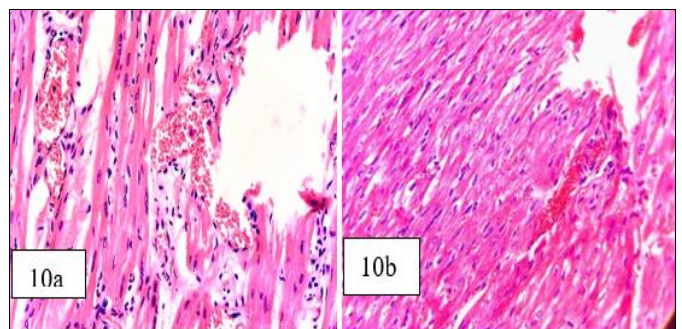
**Fig 7:** Micrograph through the muscle of a carcass affected with eosinophilic myositis (H&E 4x; H&E 10x). Diffuse leukocytic infiltration and sarcocysts. Multifocal sarcocystic schizonts are evident within cardiac muscle fascicles with congested blood vessels. a) H&E 4x; b) H&E 10x



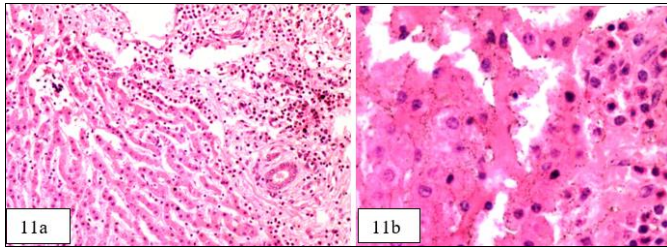
**Fig 8:** Sarcocyst in Purkinje fibers, H&E 10x (a), H&E40x (b).



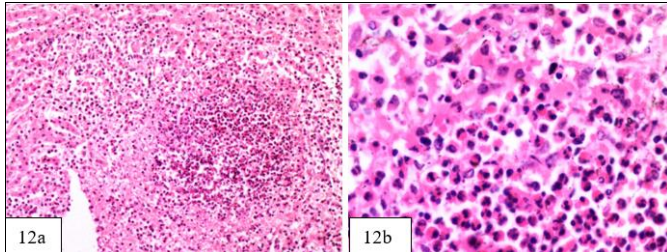
**Fig 9:** Elongated Sarcocyst containing bradyzoites in striated cardiac muscles and liberation of bradyzoites from cyst (arrow) along with diffused moderate infiltration.



**Fig 10:** Heart, sections showing congested vessels (10a; H&e 10x) and eosinophilic fibrinous substance around the blood vessels (10b; H&E 4x)



**Fig 11:** Tissue section of liver showing dilated sinusoids around the central vein (H&E 10x; H&E 40x) and b) portal areas with infiltration of inflammatory cells (H&E 40x)



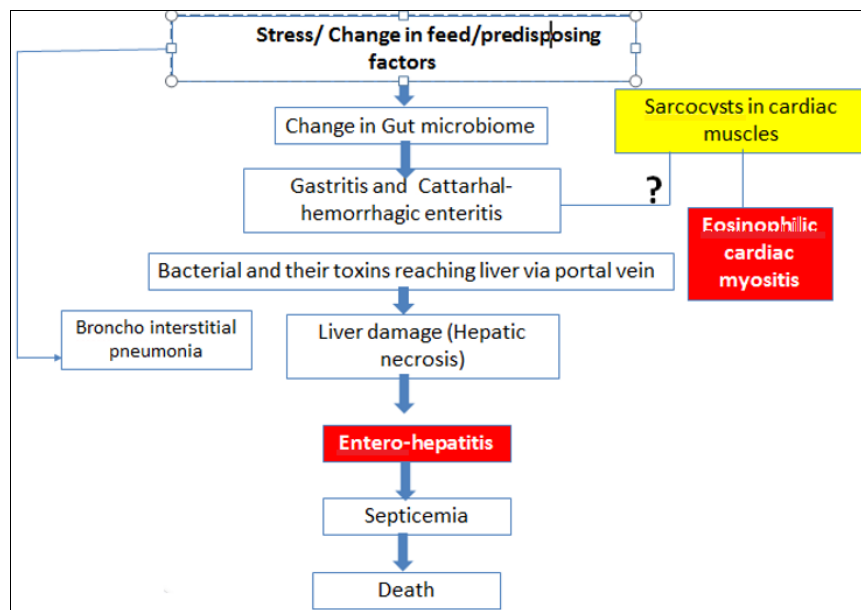
**Fig 12:** Focal area of necrosis infiltrated with numerous PMNLs (a: H&E 4x; b: H & E40x)

**Microscopic findings:** Tissue sections from heart were evident of multifocal sarcocystic schizonts within cardiac muscle fascicles with congested blood vessels (Fig.7a & b).

Micrograph through the muscle of a carcass affected with eosinophilic myositis with diffuse leukocytic infiltration and the *S. cruzi*, like sarcocysts (Fig.9). Sarcocysts were also observed in purkinje fibres (Fig. 8) and endocardium. Myocardial necrosis and cardiac muscle degeneration were evident. Myositis and myocarditis were prominent microscopic findings in heart associated with sarcocysts. Elongated Sarcocyst containing bradyzoites in striated cardiac muscles and liberation of bradyzoites from cysts were observed (Fig. 9). Heart sections showing congested vessels and eosinophilic fibrinous substance around the blood vessels (Fig. 10). Focal area of necrosis infiltrated with numerous PMNLs in liver (Fig.11 & 12) along with dilated sinusoids infiltrated with neutrophils and cells with intense eosinophilic cytoplasm (Fig. 11 & 12) leading to hepatitis.

**Discussion**

Stress conditions or change in feed as possible predisposing factors leading to catarrhal enteritis and parasitic infestation of sarcocyst in cardiac muscles leading to eosinophilic myositis and cardiac muscle inflammation (Fig.7, 9 & 10). Hepatic necrosis was evident in gross and histopathological findings along with enteritis causing septicemia and possibly leading to death.



**Fig 13:** Mechanism depicting possible causes of death

Eosinophilic myositis with diffused lymphocytic infiltration associated with *Sarcocystis cruzi* in muscles was reported by Gajadhar *et al.*, (1992) [5]. Sarcocysts were observed in Purkinje fibres by Fayer (2004) [4]. Sarcocyst infestation in muscles causing widespread myositis and inflammation of cardiac muscle was reported by Fayer (2004) [4].

**Conclusions**

Multiple possible causes leading to death (Fig. 13) with cardiac myositis particularly due to multiple sarcocysts in myocardium and hepatic necrosis were confirmed by histopathological examination. Chronic condition of *Sarcocystis* is diagnosed as multiple tissue cysts were evident in cardiac muscles during microscopic examination.

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**References**

1. Dubey JP, Lindsay DS. Neosporosis, toxoplasmosis, and sarcocystiosis in ruminants. *Vet Clin North Am Food Anim Pract.* 2006;22:645–71.
2. Dubey JP, Calero-Bernal R, Rosenthal BM, Speer CA, Fayer R. Sarcocystosis of animals and humans. *CRC*

Press. 2015.

3. Dubey JP, Calero-bernal R, Rosenthal BM, Speer CA, Fayer R. Sarcocystosis of animals and humans, 2<sup>nd</sup> edition. CRC Press, Boca Raton, Florida; c2016a, 481.
4. Fayer R. *Sarcocystis* spp. in human infections. Clinical microbiology reviews. 2004;17(4):894-902.
5. Gajadhar AA, Marquardt WC. Ultrastructural and transmission evidence of *Sarcocystis cruzi* associated with eosinophilic myositis in cattle. Canadian Journal of Veterinary Research. 1992;56(1):41.
6. Sarcocystosis in Animals MSD Vet manual by Gastón A. Moré, DVM, PhD, Immunoparasitology Laboratory, National University of La Plata, Buenos Aires, Argentina