A HISTOPATHOLOGY FINDING OF MYOCARDIAL SARCOCYSTIS IN YELLOW CATTLE BREED IN KELANTAN

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ABSTRACT. *Sarcocystis* species are intracellular protozoan parasites that can pose a threat to animal health and food safety. This report is a diagnostic case of myocardial sarcocystis from histopathology examination of organs from cattle to create awareness on parasitic infections with potential hazard for food safety and public health concern. Five sample organs (liver, lung, heart, spleen, and kidney) from a female YC cattle were received from Pusat Ternakan Haiwan Tersat, Terengganu and were processed with routinely histopathological methods. A *Sarcocystis* spp. schizont has been identified in between the muscle fiber of myocardium. Sarcocystis in cardiac muscle are common in cattle worldwide, including Malaysia. A good understanding of sarcocystis in animals and its zoonotic risk would help humans to better combat the disease, which is vital in veterinary public health.

Keywords: sarcocystis, myocardial sarcocystis, intracellular protozoan parasites.

INTRODUCTION

Sarcocystosis is one of the parasitological diseases caused by *Sarcocystis* spp., an intracellular protozoan parasite in the phylum Apicomplexa. *Sarcocystis* spp. has an indirect life cycle, which can only be completed with both an intermediate and a definitive host, typically a predator or scavenger and its prey. The parasites replicate asexually in the intermediate host and form the sexual stage in the definitive host. Intestinal infections occur in the definitive host, while tissue invasion occurs in the intermediate host (Spickler *et al*., 2020).

When the definitive host ingests encysted parasites (sarcocysts) in the muscle tissues, they become infected but many of the infections are asymptomatic. Intermediate hosts are infected with the parasite through ingesting sporocysts or sometimes sporulated oocysts which exist in water or food. Water buffaloes and cattle are the intermediate hosts of certain important species of *Sarcocystis*. They may harbor micro or macro sarcocystis on their muscles as stated by Dubey and Lindsay (2006).

There are currently more than 250 different *Sarcocystis* spp being described, in which most are distributed worldwide (More, 2021). *Sarcocystis* spp. infections are rather prevalent in farm animals which is higher than 70 % in some herbivore populations. Nonetheless, a few outbreaks of clinical disease have occured. In those cases, most of the animals were asymptomatic, to which the tissue cysts (chronic stage) were only discovered during slaughtering process (More, 2021). *Sarcocystis* spp. can result to abortions, neurologic disease, and eosinophilic myositis in cattle. It also causes acute disease in calves. Among the clinical signs are fever, decreased milk production, anorexia, diarrhea, wasting, weakness, muscle spasms, hyperexcitability, anemia, pneumonia, hemorrhages, prostration, icterus, and can also lead to death. Notwithstanding, Necrotic encephalitis has been reported as rare case in cattle (Spickler *et al*., 2020).

Most cases of sarcocysts occur in skeletal or cardiac muscles, however they could also be found in smooth muscles, and occasionally in the central nervous system (CNS). Sarcocysts range in different sizes from microscopic to visible, to which the latter is about the shape and size of a grain of rice. They can persist for different durations from months to years, though in most cases they start to disintegrate shortly after a few months. However, these parasites do not seem to be passed from one intermediate host to another, even when they are eaten (Spickler *et al*., 2020).

The conventional tools to diagnose *Sarcocystis* spp. are based on transmission electron microscopy, structure of the cyst wall in the striated muscles of the intermediate host or information about the lifecycle of the parasite (Jehle *et al*., 2009). However, due to morphologic variations in these procedures, the methods are not exactly reliable during the species-specific identification. Other than that, electron microscopy is not an option for wide and extensive detective studies (McManus & Bowles, 1996).

The present report intends to highlight the case of intracellular protozoan parasitic discovered histologically in the cardiac muscle of bovine case diagnosed by the Eastern Zone Veterinary Laboratory in Kelantan, in order to raise the awareness on parasitic infections which could cause zoonotic infections specifically from food borne disease.

MATERIALS AND METHOD

The organ samples of a 12-year-old female bovine of Yellow Cattle (YC) breed that consist of heart, liver, spleen, lung, and kidney in ice for routine bacteriology examination, stored in 10 % buffered formalin for histology examination were received by Eastern Zone Veterinary Laboratory in Kelantan from *Pusat Ternakan Haiwan* (PTH) Tersat, Hulu Terengganu for disease diagnosis. However, there was no additional information on the samples that was provided by the sender, which has caused limitation for disease diagnosis. For histology examination, the organ specimens were thereafter processed routinely i.e., fixed in 10 % buffered formalin, before being embedded in paraffin, then sectioned into five-micrometer sections, and later stained with H&E for histopathological examination.

RESULTS AND DISCUSSIONS

Results from the histological examination of the heart sample showed that a schizont was found in the myocardium, identified as *Sarcocystis* spp. with interstitial red blood cells (Figure 1, 2, and 3).

Figure 1. Sarcocyst spp. found in the myocardium (H&E, x10).

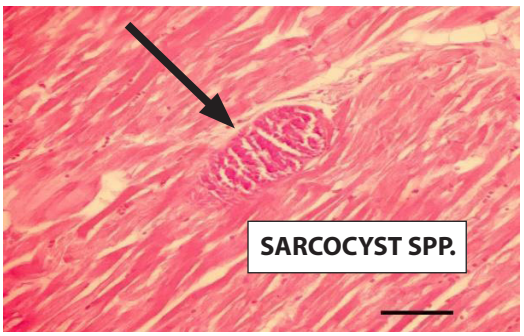

Figure 2. Sarcocyst spp. in the myocardium (H&E, x20).

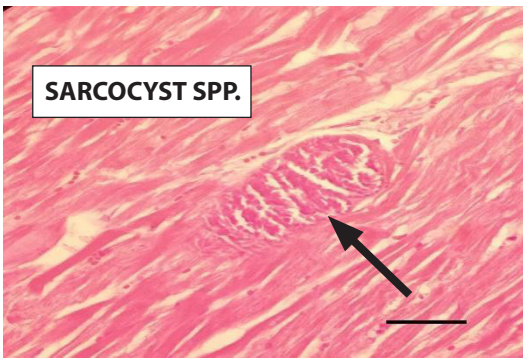

Figure 3. Sarcocyst spp. in the myocardium under higher magnification (H&E, x40).

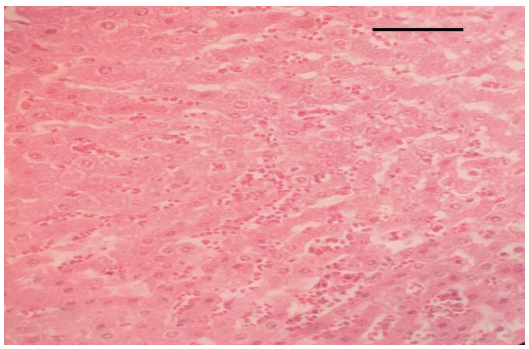

Figure 4. Liver showing interstitial hepatitis (mix inflammatory cells of neutrophil & lymphocytes) and interstitial RBC within the hepatocytes (H&E, x 40).

Sarcocysts spp. had been identified by its cylindrical shape, and hematoxylin stain bradyzoites inside the thin cyst wall. They were found between and along the length of the muscle fiber (myocardium). Nevertheless, the species of sarcocystis were not identified due to lack of standard method used, which can be performed by observing the cyst wall via light and electron microscopy (Dubey *et al*., 2016; Gjerde, 2016) and molecular methods (Stojecki *et al*., 2012). Other histology examination revealed interstitial hepatitis with mix inflammatory infiltrates (lymphocyte and neutrophils) and interstitial red blood cells (Figure 4), while there was no significant finding from the kidney, lung, and spleen. For routine bacteriology examination, *Staphylococus* spp. has been isolated from lung, kidney, heart, and liver.

Sarcocystosis is rather prevalent in farm animals. According to the study of More (2021), only few clinical disease outbreaks have been reported. The parasite is normally discovered only during slaughter because most infected animals are asymptomatic, which is similar to this case. There are limitations of this case which include insufficient clinical sign history as well as postmortem findings, which hinder the effort for disease diagnosis. The cause of death and diagnosis can be determined based on bacteriology and histology results.

CONCLUSION

In conclusion, the disease diagnosis of the cattle is septicaemia due to staphylococcosis with concurrent myocardial sarcocystis infection. Sarcocystis in cardiac muscle are common in cattle worldwide. A good understanding of sarcocystis in animals and its zoonotic risk would help humans to better combat the disease, which is vital in veterinary public health.

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