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A Histopathological Appraisal of Ovine Sarcocystosis in Kelantan

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ABSTRACT

Sarcocystosis is most frequently seen in older sheep and goats. Sarcocystosis is caused by specific protozoan not considered pathogenic for humans in the United States, although it was recognized in other investigations of zoonotic risk and importance. Histopathology examination of myocardial muscles from 72 necropsies of ovine species in Kelantan state at the Department of Veterinary Services and Faculty of Veterinary Medicine /UMK revealed that 38% of the post mortem animals with morpho-microscopic changes of either Mild, Moderate or Severe Sarcocysts species parasitisim. The histopathological interpretation and assessment of tissue sections from the natural cases of myocardial protozoa infection indicate an alteration of pathological entity started as myodegeneration upgraded by myonecrosis and the most sever condition was the myocarditis of eosinophilic nature and vasculitis. Few cases showed a mixed and combined existence of most histo- changes mentioned earlier. Sarcocysts were clearly recognized in the tissue sections of all examined cases.

Keywords: **Sarcocyst, parasitic disease, histopathology, protozoan parasite, ovine**

1. Introduction

Sarcocystosis has been reported in primates, other animal species (Latif et.al., 1999; Latif and Khamas, 2007), and humans. (Dubey et al., 1989). Although common, this parasite is usually considered non-pathogenic and an incidental finding during necropsy, particularly in wild-caught animal. *Sarcocystis* spp. is apicomplexan protozoa affecting a broad range of vertebrates. Typically, *Sarcocystis* spp. relies on a 2-stage life cycle involving an intermediate and definitive host. The intermediate host (typically a herbivore or omnivore) becomes infected by ingesting infective zoites excreted in definitive host faeces (typically carnivores) (Buxton, 1998; Dubey, 1977).

The presence of microscopic cysts (sarcocysts) is commonly noted in most production species as incidental findings, particularly sheep and cattle. Within Australia, 93% of sheep have demonstrable microscopic cysts within striated muscle, and 97% have serological evidence of exposure (NAHIS, 2005; Wikipedia, 2012; Tohru, 2011). In Malaysia the

parasite has been recognized in animal and man (Wong and Pathmanathan, 1992; Latif et al., 2010). This paper highlight a histpathological analysis to the reaction of tissue in naturally infected animals' necropsies for suspects on some other concurrent diseases.

2. Methodology

Cases of suspected myopatheies have been looked for the presence of the sarcocyst parasite and its influential changes exerted in tissue. Samples of tissue from cardiac and skeletal muscles have been reviewed for sarcosystis occurrence at histopathology level. Tissue specimens were collected at the years 2010 -2011 from the department of Veterinary Services in Kelantan and from cases at necropsy in the faculty of veterinary Medicine, university Malaysia Kelantan. All cases were adult in an age range between1-4 years old. These cases were examined histoparasitologicaly and reviewed. Tissue sections were prepared and examined under light microscopy for morphological analysis of cellular changes in the myocardial and skeletal muscles. Cases verified were only from ovine species.

3. Results

Out of 72 case of ovine (56 female and16 male) examined for morph- pathology analysis of cellular tissue changes,number of positive cases are 38 (52.8%) that has a definitive sarcosyst parasite infection. The female represent 31(43.05%)and the male 7(9.7%). Three forms of microscopical cellular alterations were diagnosed ,the first is the mild form which consist of one dormant cyst embedded in myocardial or skeletal muscle fibres and no reaction was demonstrated around the sarcocyst or tissue response (Fig.1).The second is the moderate form that showed many sarcocysts in the field of microscopic tissue sections with some changes in the muscle bundles or myofibrils that suffers from degeneration and compression with minimal tissue reaction of cellular and vascular response (Fig.2). The third is the severe form of tissue response which was intense reaction with the presence or unnoticed parasite cysts in the tissue sections. There was heavy inflammatory process escalating and tremendous infiltrates of inflammatory cells are present in the muscle fibres and in between the bundles. Many of those cells were undergoing degeneration while few were intact and active in the field of inflammatory response leading to myo-necrosis and myositis (Fig.3). The main inflammatory cells were of granulocytic series are eosinophils less in number is the neutrophils with other monocytes like lymph cells .Those cells were accumulating in between the myocardial or skeletal muscle fibres covering an area of inflamed muscle tissue. Mostly this microscopic alteration accompanied either by rupture or disintegration of sarcocyst wall and liberation of sporozoites in the tissue. The lesions involved generalized endothelial infection with an unidentified

Sarcocystis sp. Immature and mature zoites found within endothelial cells were most prevalent in the cardiac muscle, mature tissue cysts were found in myocardium and in skeletal muscle

4. Discussion

Sarcocystis spp. varies greatly in their pathogenicity. In most species, an acute syndrome (Dalmeny disease) is associated with 2 phases of schizogony within endothelial cells of small blood vessels (Buxton, 1998). Experimental studies have characterized the initial hemorrhagic phase, followed by invasion of parenchymatous tissues by first-generation merozoites, and this can be followed by an early, severe inflammatory response(Dubey , 1988) Following the acute phase, tissue cyst formation occurs. In cattle and sheep, degenerating cysts are associated with a rare condition, eosinophilic myositis, (Van Vleet and Valentine, 2007) which is presumed to be a delayed hypersensitivity reaction. It is this chronic condition that is most visible to producers, since muscular necrosis typically leads to carcass downgrading. The lesions involved generalized endothelial infection with an unidentified *Sarcocystis* sp. Immature and mature zoites found within endothelial cells were most prevalent in the cardiac muscle, mature tissue cysts were not found in myocardium and seen in skeletal muscle (Lane, et al., 1989).The observation of histopathology in our natural cases are different from the aforesaid statement by Lane et al. (1989) and is not in accord to their findings. The propose pathogenic effect is a progressive process starting from mild advanced to moderate then ended at a severe reaction in the intermediate host tissue. Factors promote to convert change can either linked with concomitant infection or initiated immune modulation response which affect the lyses or rupture of cyst wall and liberation of infective and/or immature zoites in the tissue.

Mandour (1969) described *Sarcocystis nesbitti* in rhesus macaques. In addition, an unidentified *Sarcocystis* sp. has been reported in rhesus macaques (Mehlhorn , et al.,1977). However, these sarcocysts had a cyst-wall morphology type 1, different from the cyst-wall morphology observed in the sarcocysts in this work. Although the specific species have never been identified. The importance of this disease comes from its zoonotic property and asymptomatic reaction of humans to infection (Fayer,2004).Human sarcocystosis is prevalent in Malaysia (Pathmanathan and Kan,1992) as the rate of infection was 21% in 100 consecutive autopsies (Wong and pathmanathan,1992) among that a seroprevalence study found evidence of infection in 20% of 243 Malaysians (Thomas and Dissanaike,1978).The infection rate in ovine is commonly above 90% (Pereira and Bermeijo,1988;Latif et al.,1999;Woldemeskel and Gebreab,1996;Fukuyo et al.,2002). This figure should motivate further research work on this disease in production and wild life animals in Malaysia to limit its spread and zoonosis.

5. Conclusion

Three forms of tissue reactions were verified after confirmed cases of ovine infection with sarcocyst in two types of muscle cells, myocardial and skeletal. Histopathology analysis of tissue changes revealed mild, moderate and severe microscopic alterations in histological morph- pathology of the lesions.

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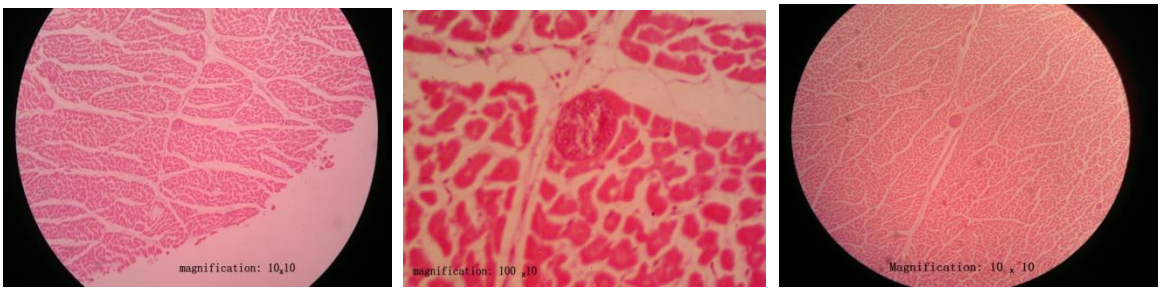
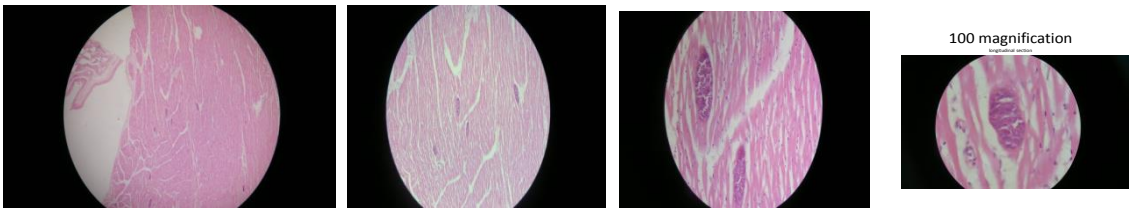
Fig 1: Mild Form of sarcocyst infection in ovine muscle. a) skeletal muscle with dormant sarcocyst (arrow).b) Sarcocyst in cardiac muscle (arrow).c) Sarcocyst (central) embedded in between muscle bundles with no tissue reaction seen.



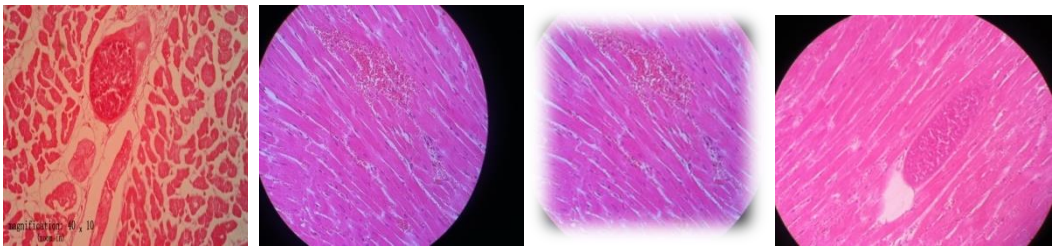
a b c

Fig 2: Moderate form of sarcocyst infection in ovine muscle. A&b) Few cysts with minimal reaction of tissue. c) Tissue reaction specified. D) Higher magnification of c.



a b c d

Fig 3: Sever form of tissue reaction in muscle. a) Sarcocyst cross section at purkeinje muscle fibre. b&c) severe inflammatory reaction mostly composed of eosinophils and less neutrophils forming a myositis dominated by eosinophilic tissue response. d) Myositis with eosinophilia in the presence of dead degenerated sarcocyst.



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