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First Case of Pulmonary Acariasis in a Pig-Tailed Macaque in Malaysia

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ABSTRACT

A 15 year-old male, southern pig-tailed macaque (*Macaca nemestrina*), was found to have a history of bloody urine, inappetance, weight loss, and was weak before death. Multiple yellow to gray nodular-like lesions were observed grossly all over the lung. Some of the nodules were flattened and some were raised and there were also cavitations and tubercles-like lesions on the cut surface. Histopathologically, focal granulomatous lesions were seen throughout the lungs, especially those with the presence of mites. There were moderate alveolar macrophages observed with mild eosinophilic, plasma cells, and slight lymphocytes and neutrophilic cells infiltration. There was also the presence of the brownish mite pigments in the lung tissue as well as in macrophages. Diagnosis was made from the morphological observation of intact mites isolated from lung tissues. This is the first report on pulmonary acariasis in Malaysia.

Keywords: Pulmonary acariasis, pig-tailed macaque, diagnosis

INTRODUCTION

Pulmonary acariasis is the most common endoparasite of the respiratory system affecting non-human or old world primates (Andrade *et al*., 2007). There were reports which indicate that pulmonary acariasis is most often found in macaques or *Macaca* genus (Hiraoka *et al*., 2000; Innes *et al.,* 1953). Although very limited number of reports have been published sporadically regarding the incidence of pulmonary acariasis, there has yet to be any case reported from Malaysia.

Pulmonary acariasis is defined as infestation of lung with mites. There are several species of mites which have been known to parasitize the respiratory system of primates. These include *Pneumonyssus simicola, Pneumonyssus duttoni, Pneumonyssus congoensis, Pneumonyssus stammeri, and Pneumonyssus dinoltiga.* Among these species, much attention was given to *Pneumonyssus simicola* as the main cause of pulmonary acariasis (Hiraoka *et al.,* 2000).

MATERIALS AND METHODS

A male, southern pig-tailed macaque, aged 15 years-old, was sent to the Faculty of Veterinary Medicine, Universiti Putra Malaysia for post mortem. Prior to death, the monkey was inappetant, losing weight, and it had haematuria and was very weak.

An examination of the carcass revealed that the monkey was in poor body condition. Grossly, there were multiple pale yellow to gray nodular-like lesions of various sizes found scattered throughout the lungs. Meanwhile, the cut surface of the nodules was found to be raised while some others were flattened indicating cavitations and suggesting tuberculous appearance.

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Portions of the affected lung samples were obtained and immediately fixed in 10% buffered formalin. Paraffin-embedded sections were then routinely stained with haematoxylin-eosin (H&E).

RESULTS AND DISCUSSION

Histopathological findings revealed the presence of mites in multifocal granulomatous lesions which consisted of numerous alveolar macrophages, mild infiltration of eosinophils, plasma cells, and lymphocytes with slight neutrophilic infiltration. The lungs showed fibrinous pleuritis, localized bronchiolitis, peribronchiolitis, focal lobular pneumonitis, as well as some degree of bronchiolectasis and slight edema. This is in agreement with the findings of some other researchers (e.g. Kim *et al.,* 1972; Hirakoa *et al.,* 2000; Andrade *et al*., 2007).

One of the unique and peculiar features of pulmonary acariasis is the consistent findings of pigments as described by Kim *et al*. (2003) and Davis (1945). In this case, there were also depositions of yellow-brown, refractile pigments, whereas many macrophages laden with these pigments were observed. It is believed that these brown pigments are the excretory products of mites which have ingested the host's blood. These findings are similar to those reported by other researchers (Davis, 1945; Innes *et al.,* 1954; Stone and Hughes, 1969; Hiraoka *et al.,* 2000; Andrade *et al*., 2007).

To further confirm the diagnosis in the present study, the fixed lung tissues were obtained and softened before the nodules were teased apart to retrieve the mites which were then fixed in 70% alcohol and mounted in Hoyer's medium. They were later identified as *Pneumonyssus spp.,* based on their morphology. As most reports have assumed that pulmonary acariasis is caused by *Pneumonyssus simicola* without properly identifying the mite prompted, there is a need to ascertain the true identity of the mite behind pulmonary acariasis. Mites are easily identified when both male and female are found and by looking at the extended chelicerae of the male which can be seen even clearer. However, Loos-Frank (1986) suggest that the identification is even difficult since females predominate in ratio of 7 to 8 to 1 male.

Infected monkeys are often asymptomatic and rarely show any clinical signs. Although some monkeys were severely infested by these mites, Innes *et al*. (1954) stated that the most common signs reported were sneezing and coughing. In addition, there was also evidence suggesting that infected monkeys in the wild showed more tolerance to the presence of these mites. However, when subjected to new environment or stressful factors, the monkeys would soon succumb to pulmonary acariasis.

Pulmonary acariasis rarely causes death but more often found as an incidental finding (Stone and Hughes, 1969) and thus makes it more challenging to carry out diagnostic tests on live monkeys. There are cases where the pulmonary acariasis is very severe and it usually occurs concurrently with other diseases or stressful factors like poor nutrition, overcrowding, effect of translocation, and old age or concurrent diseases which can lead to death. In this case, the cause of death is due to pulmonary failure, as a result of pulmonary acariasis, which is characterized by the massive inflammatory cells infiltration and reactions.

Recommended treatment and control measure for pulmonary acariasis is single ivermectin injection (200 microgram/kg). This is according to a research conducted by Joseph *et al*. (1984), whereby monkeys treated with ivermectin showed less inflammation, whereas presence of only dead and fragmented mites was observed as compared to untreated monkeys which were found to have more severe inflammation with live mites seen in the lungs.

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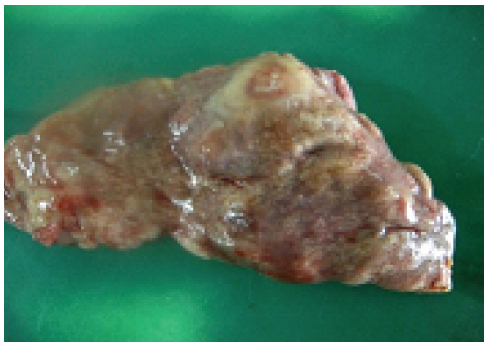

Fig. 1A: Macroscopic appearance of the lung with multiple pale yellow to gray nodular like lesions of various sizes throughout the lung

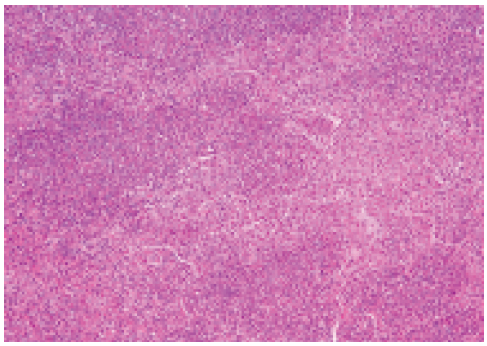

Fig. 1B: Photomicrograph of the lung indicating hypercellularity and minimal air spaces (H&E x100)

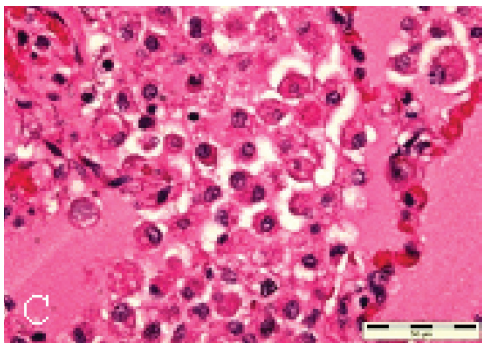

Fig. 1C: Photomicrograph of the lung with evidence of numerous macrophages, eosinophils and plasma cells in oedema fluid (H&E x400)

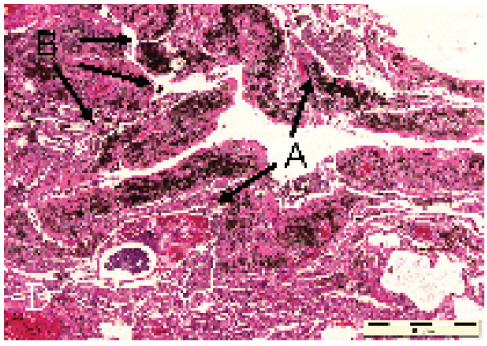

Fig. 1D: Photomicrograph of the lung showing Pneumonyssus spp. *(A) and masses of brown pigments (B) [H&E x40]*

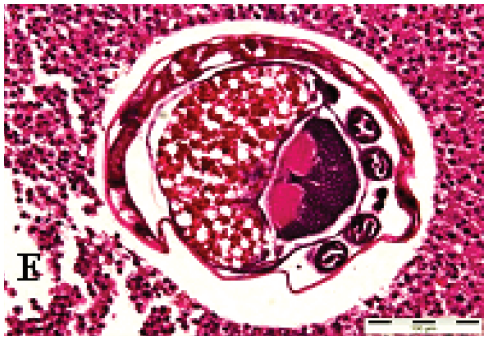

Fig. 1E: Photomicrograph of the lung showing a single mite characterized by exoskeleton, striated muscle and gut segments surrounded by inflammatory cells (H&E x200)

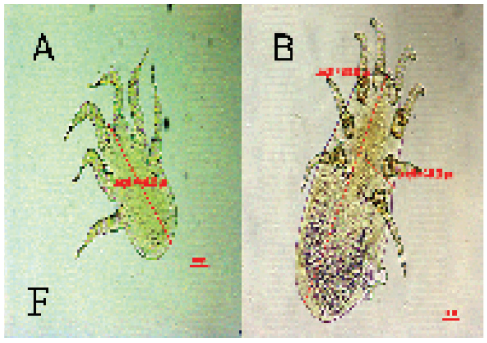

Fig. 1F: Photomicrograph of Pneumonyssus spp. *isolated from the lung and mounted in Hoyer's medium. Six-legged larva (A) and eight-legged adult (B) x 200*

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