A Case of Pulmonary Acariasis in Lung of Japanese Macaque

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ABSTRACT. A 20-year-old female Japanese macaque, weighing 8.7 kg, developed severe pulmonary acariasis. Numerous whitish nodules, 2–4 mm, were scattered throughout the lungs. Histologically multifocal granulomatous lesions consisting of a large number of eosinophils, epithelioid cells, foreign body type giant cells, and collagen fibers were aggregated around the mite bodies. Numerous mast cells were also detected in the lesions by toluidine blue staining, and tested positive for tryptase by immunohistochemistry. This may be the first reported case of severe pulmonary acariasis in a Japanese macaque.

KEY WORDS: Japanese macaque, pulmonary acariasis.

Pulmonary acariasis is generally observed in many species of Old World monkeys, especially in wild-caught macaques, and is most frequently observed in rhesus monkeys [4]. Ishida [4] and Yamamoto [11] reported pulmonary acariasis caused by Pneumonyssus simicola parasitism in rhesus macaques and pig-tailed macaque in Japan, but details of pathological features in those cases were unclear. There has been no reported case of pulmonary acariasis in Japanese macaques. In this study, we describe histopathological features of a severe case of pulmonary acariasis in a Japanese macaque.

The monkey was a 20-year-old female Japanese Macaque, weighing 8.7 kg, maintained for experiments under conditions in a private air-conditioned room at the Primate Research Institute of Kyoto University. The monkey was sacrificed by exsanguination under deep anesthesia with Ketamin hydrochloride and Nembutal according to the euthanasia guidelines, approved by the Primate Research Institute of Kyoto University (1986). A portion of the lungs with nodules was removed and fixed in Bouin’s solution. Paraffin-embedded sections were prepared and subjected to hematoxylin-eosin (HE), Masson’s trichrome, toluidine blue staining, Schmorl’s reaction, and Berlin blue and van Geison’s staining. Immunohistochemical staining was performed by the streptavidin-biotin (SAB) method using mouse anti-human mast cell tryptase monoclonal antibody (CHEMICON INTERNATIONAL Inc., U.S.A.). Numerous whitish nodules measuring 2–4 mm in diameter, were scattered throughout the lungs. The cut surface of the nodules was composed of a number of fused whitish nodes with sponge-like appearance in some regions.

Histologically, multifocal granulomatous lesions consisting of a extremely large number of eosinophils, histiocytes, plasma cells, foreign body type giant cells, fibroblasts, and a large amount of collagen fibers were observed around the mite bodies (Figs. 1, 2). Small cavities lined by low epithelia were also observed in some granulomas. Russell bodies were frequently observed in aggregates of plasma cells. By toluidine blue many mast cells were detected in monocytes (Fig. 3) which were positive for anti-tryptase antibody by immunohistochemistry (Fig. 4). In some granulomas, deposition of Berlin blue-negative and Schmorl’s reaction-positive yellow-brown granules, and infiltration of many macrophage were prominent. Furthermore, alveolar edema and hypertrophy of the visceral pleura were observed. Hypertrophy and separation of smooth muscle in the tunica media of the peripheral pulmonary artery accompanied by eosinophil infiltration and hypertrophy of small vessels seem to be signs of aging. Most normal lung structures disappeared and there was no normal bronchial structure.

There are some species of mites that parasitize the respiratory system of monkeys. These include Pn. simicola, Pn. duttoni, Pn. congoensis, Pn. stammeri, and Pn. Dinoltiga [4]. Of these mites, Pn. simicola is most frequently reported, and descriptions of pulmonary lesions are limited to Pn. Simicola [1–8, 10, 11], which provides a strong basis for mite identification [4]. Although it was difficult to identify the mite seen in the granulomas in the present case, it was considered to be Pn. simicola.

Usually pulmonary acariasis is accompanied by clinical symptoms of ictal coughing and sneezing, and in severe cases, it may cause death. However, most lung lesions were discovered as incidental lesions in monkeys that died of pneumonia or enteritis [4]. In such cases, being unrelated to the direct cause of death in many cases. In this case, although no particular clinical symptoms were seen, the lungs showed an advanced condition of pulmonary acariasis.

The histological features of pulmonary acariasis previously reported were small cavity lesions, granulomatous reactions accompanied by infiltration of neutrophils, eosinophils, plasma cells around the granulomas, bronchiolitis, peribronchitis, bronchiectasis, and deposition of yellow brown granular pigments considered to be mite excrement.
In the lungs investigated in this study, cavitation, deposition of yellow-brown granular pigments, and many histiocytes phagocytosing these deposits were observed, showing the same features as in the previous reports. However, this case was histologically unique in that there were marked eosinophil infiltration and many mast cells were detected by toluidine blue-staining and immunohistochemical staining with anti-tryptase antibody. These had not been previously reported, suggesting that severe allergic reaction had occurred. It has been known that mast cells produce various cytokines, and tryptase that is a preformed mediator in mast cell granules increases the number of fibroblasts [9]. In addition, Lee et al. [8] pointed out the role of allergic reactions in pathogenicity of granulomatous lesions in lung mite infection. In the present report, the histopathological features indicated an allergic response to pulmonary acariasis in macaques.

REFERENCES


