Pneumocystis carinii pneumonia in a Cavalier King Charles Spaniel

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ABSTRACT. Pneumocystis carinii pneumonia was diagnosed by postmortem examination of a one-year-old Cavalier King Charles Spaniel with a four-week history of dyspnea. Cytologic and histologic examination of lung tissues revealed numerous P. carinii trophozoites and cysts, and P. carinii specific DNA was detected by polymerase chain reaction. The dog showed hypogammaglobulinemia and extremely low levels of serum IgG. It was considered that P. carinii pneumonia in this case was associated with an immunodeficient condition which has already been reported in Miniature Dachshunds.

KEY WORDS: Cavalier King Charles Spaniel, immunodeficiency, Pneumocystis carinii.


Pneumocystis carinii (P. carinii) is an organism of uncertain taxonomy. It was thought to be a protozoan but has recently been classified as a fungus. It affects both animals and humans, although infections are usually subclinical. It can cause severe or sometimes fatal pneumonia especially in immunosuppressed hosts such as human patients with acquired immunodeficiency syndrome. In dogs, Pneumocystis pneumonia has been most commonly described in Miniature Dachshunds [3, 4, 6, 7]. Immunological studies have revealed that Pneumocystis pneumonia is associated with immunodeficiency in this breed [7]. This is a first report which describes a case of P. carinii pneumonia in a young Cavalier King Charles Spaniel in Japan.

A one-year-old male Cavalier King Charles Spaniel, weighing 7.3 kg, presented at the Veterinary Medical Center of the University of Tokyo with a four-week history of anorexia, coughing and respiratory distress. Treatment with antibiotics (cefazolin sodium and amikacin sulfate), bronchodilator (aminophylline) and nebulization (gentamicin sulfate with sterile saline solution) was unsuccessful. The dog died the day after presentation due to the progression of respiratory distress.

On postmortem examination, transcutaneous fine-needle aspiration (FNA) samples and Tru-cut biopsy specimens were taken from the right lobe of the lung. Giemsa-stained smears of the FNA samples revealed multinucleated bodies containing up to 8 nuclei and a large number of similar nuclei, which morphologically resembled P. carinii cysts.
and trophozoites, respectively (Fig. 2a). Formalin-fixed and paraffin-embedded lung tissue of Tru-cut specimens were stained with hematoxylin and eosin (HE) and Grocott's methenamine silver staining (GMS). HE stained samples revealed that the alveolar space was filled with eosinophilic foamy substances (figures not shown). GMS staining allowed identification of a numerous number of cystic structures consistent with *P. carinii* in the alveolar exudate (Fig. 2b).

A polymerase chain reaction (PCR) for the detection of *P. carinii* was performed to confirm the organism in the lung specimen [5]. DNA was extracted from the specimen by proteinase K digestion and phenol/chloroform. The oligonucleotide primers reported by Wakefield and others [11]...
were used in the amplification reaction mixture with denatur-ation at 94°C for 90 sec, annealing at 50°C for 90 sec and extension at 72°C for two min, for 40 cycles. The amplifi-cation products were subjected to electrophoresis in 1.0% agarose gel, followed by visualization with ultraviolet light after ethidium bromide staining. The P. carinii specific DNA band (312 base pairs) was observed in the samples from lung specimen of the dog (Fig. 3). The amplified DNA was sequenced and found to be identical (data not shown) with that of previously reported dog P. carinii [5].

The clinical features of Pneumocystis pneumonia are non-specific except for dry lung sounds, nonproductive cough, and low grade or absent fever. Definitive diagnosis has been based on the detection of organisms or on amplification of specific DNA in samples from the lower respiratory tracts by bronchoalveolar lavation or FNA of the lung. If patients are suspected of Pneumocystis pneumonia, specific therapy such as trimethoprim-sulphamethoxazole should be started. In this case, we could not confirm the diagnosis until the postmortem examination.

Lobetti reported an immunological study of seven Miniature Dachshunds which were diagnosed as P. carinii pneumonia [7]. Most of these dogs showed decreased serum IgG concentrations compared with healthy controls. To our knowledge, there have been five cases of Cavalier King Charles Spaniels affected with P. carinii pneumonia [1, 2, 8, 10]. In these reports, Ramsey et al. suggested that there may also exist a certain breed-specific factor in this breed [8]. In our case, the affected Cavalier King Charles Spaniel showed hypogammaglobulinemia on serum protein electrophoresis and a low level of IgG on serum immunoglobulin fraction quantification. These findings are very similar to those of the Miniature Dachshunds reported by Lobetti [7]. It is possible that there may also be a certain immunodeficient condition in Cavalier King Charles Spaniels which causes P. carinii infection.

REFERENCES