A Case of Canine Systemic Nocardiosis

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ABSTRACT. A 6-month-old puppy died after exhibiting high fever, diarrhea, and respiratory symptoms and was histologically diagnosed as nocardiosis. Necropsy revealed nodular lesions in the thoracic and visceral organs. Histologically, granulomatous lesions were seen in the liver, cerebrum, cerebellum, pancreas, spleen, myocardium, kidneys, diaphragm, gastrocolic omentum, and lungs. They were characterized by central necrosis surrounded by epithelioid cells, lymphocytes, and neutrophils. Gram-positive, mildly acid-fast, filamentous, branching organisms were detected in the lesions.—KEY WORDS: granuloma, nocardiosis, puppy.


Nocardiosis is a suppurative granulomatous disease characterized by focal necrosis and abscess formation. Canine nocardiosis is classified into three forms: systemic, thoracic, and cutaneous [12]. The systemic form of the disease can be differentiated from canine tuberculosis by the morphological and staining characteristics of Nocardia spp. [5, 9, 12, 13]. This paper reports a puppy case, which was histologically diagnosed as nocardiosis.

A 6-month-old mongrel puppy was admitted to a veterinary clinic located near Matsumoto City, Nagano Prefecture, on November 24th, 1983. The dog was listless and in poor condition, exhibiting high fever (39.8°C), yellowish watery diarrhea, mucopurulent ocular and nasal discharges, and respiratory difficulties. Examination by X-ray disclosed swelling of the liver and edematous lungs. He had no history of vaccinations for canine distemper and hepatitis. These signs and history prompted a tentative diagnosis of canine distemper. The dog was treated with mixed antiserums of canine distemper and hepatitis, antibiotics, vitamins and corticosteroids. The dog, however, died 4 days after the start of the treatment without visible improvement.

At necropsy, the dog was seen to be emaciated and dehydrated. The liver was swollen to 1.5 times its normal size, and multiple yellowish-white nodules ranging from 1 to 10 mm in diameter were noted on the surface (Fig. 1). The lungs were grayish-white in color and showed slightly edematous swelling. Bead-shaped whitish nodules were seen on the gastrocolic omentum as well as on the diaphragm (Fig. 1). Three round reddish-white nodules ranging from 5 to 8 mm in diameter were seen on the spleen. Numerous whitish foci ranging from 1 to 7 mm in diameter were seen on the kidneys. Miliary whitish nodules were scattered on the endocardium and pericardium.

For histological examinations, tissue blocks were fixed in 10% formalin, and paraffin sections were cut and stained with hematoxylin and eosin (HE), Gram’s method, Ziehl-Neelsen technique, and periodic acid-Schiff (PAS) procedure. Histologically, the lesions were granulomatous in nature. In the liver, each granulomatous focus was characterized by an advanced central necrosis surrounded by a large
amount of epithelioid cells and lymphocytes. The sinusoids were dilated and infiltrated with reticuloendothelial cells (Fig. 2). A few granulomas, similar to those found in the liver, were seen in the pancreas, cerebrum, cerebellum, and myocardium. In the kidneys and spleen, miliary granulomas were scattered and several adjacent granulomas fused with each other and formed larger necrotic lesions surrounded by epithelioid cells, lymphocytes and neutrophils. The diaphragm (Fig. 3) and gastrocolic omentum exhibited suppurative granulomas which were characterized by infiltrations of epithelioid cells and predominant neutrophils. Necrotic foci were scattered throughout the lungs. The alveoli, surrounding those necrotic foci, were filled by a large number of round-shaped epithelial cells, spindle-shaped epithelioid cells and lymphocytes.

Eosinophilic cytoplasmic inclusion bodies were observed in the epithelial cells of the bronchioles, renal pelvis, and urinary bladder.

Gram stain revealed numbers of Gram-positive organisms, filamentous and branching in shape, in the lesions of all organs (Fig. 4). The organisms were stained faintly reddish in color with Ziehl-Neelsen technique. No organisms stained PAS-positive were detected in any lesions.

The gross lesions of the present case were similar to those of canine tuberculosis or neoplasm. The tuberculous lesions in dogs are usually small, firm, fibrous, and grayish-white, and therefore, the disease is often grossly misdiagnosed as neoplasms [1, 6, 8]. Histologically, lesions in canine tuberculosis consist of a mass of large epithelioid cells mixed with fibroblast-like cells surrounded
by collagen fibers, though Langhans's giant cells are rarely seen [1, 10]. Microscopic lesions seen in the present case were different from canine tuberculosis because neutrophilic infiltrations were predominant and few collagen fibers were seen. Also the organisms seen in all lesions were filamentous and well branched in shape, unlike Mycobacterium spp., and demonstrated less reddish brightness in Ziehl-Neelsen technique. Furthermore, the dogs are resistant to tuberculosis in general [6], and it is difficult to conceive such an extent of lesions developed by tuberculosis in 6 months.

Besides tuberculosis, another canine disease which exhibits systemic granulomas associated with Gram-positive, acid-fast bacilli is nocardiosis [5, 9, 12, 13]. Canine nocardiosis is classified into three forms; systemic, thoracic, and cutaneous [12]. In the systemic form, granulomatous lesions develop not only in the thoracic and visceral organs [2, 3, 4, 7, 11], but also in the central nervous system [14] as seen in the present case. Microscopic lesions in the disease have been reported as a diffuse, suppurative inflammation accompanied by necrosis and infiltration of epithelioid cells and lymphocytes [4, 11, 13, 14]. Gram-positive, filamentous, branching organisms showing mild or inconsistent acid-fast staining properties, which were emphasized by previous authors, were observed in the lesions of the present case [3, 7, 11, 12, 13].

Canine nocardiosis often occurs in dogs less than 12 months of age and the mean age of all affected dogs in the literature is 9 months [13]. Furthermore, it is reported that nocardiosis occurred concurrently with canine distemper or was associated with corticosteroid therapy [2, 11, 13]. In the present case, eosinophilic cytoplasmic inclusion bod-

Fig. 3. A supplicative granuloma seen in the diaphragm. Note predominant neutrophilic cell-infiltrations. HE stain, ×33.

Fig. 4. A large number of Gram-positive organisms detected in the granuloma of the kidney. They are filamentous and well branched in shape. Gram's stain, ×132.
ies were observed in the epithelial cells of the bronchioles, renal pelvis and urinary bladder, strongly indicating that the dog was affected with canine distemper.

In conclusion, histological diagnosis on the present case was nocardiosis.

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REFERENCES