MALIGNANT PLASMA CELL NEOPLASIA IN FERRETS: A REVIEW OF 6 CASES

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Abstract

Malignant plasma cell neoplasms are rarely documented in ferrets. This article reviews the clinical findings for 6 ferrets with histopathologically confirmed malignant cell neoplasia. The most common clinical sign was hind limb ataxia or paresis (5/6), although hyperglobulinemia was identified as the most consistent hematologic abnormality (5/6) between cases. At the time of diagnosis, the malignancy had disseminated into >4 locations in most of the ferret patients. The clinical presentation of malignant plasma cell tumors in the ferret may be similar to that of multiple myeloma in other species. Practitioners should consider malignant plasma cell neoplasia when encountering ferrets with unexplained ataxia, paresis, and palpable masses, especially when accompanied by increases in gamma globulins. Copyright 2017 Elsevier Inc. All rights reserved.

Key words: malignant plasma cell neoplasia; ferret; systemic plasmacytoma; solitary osseous plasmacytoma; multiple myeloma; monoclonal gammopathy

Malignant plasma cell neoplasia is poorly characterized in domestic ferrets.[1-3] This case series provides a review of the clinical presentations of 6 ferrets with histopathologically diagnosed malignant plasma cell neoplasia. In domestic animals, plasma cell neoplasms include malignant/disseminated plasma cell neoplasia, solitary osseous plasmacytoma, and extramedullary plasmacytoma. Extramedullary plasmacytomas are generally benign and localized to soft tissues. Solitary osseous plasmacytomas are lytic, locally destructive neoplasms that adversely affect bone marrow.[4]

In domestic animals and people, malignant plasma cell neoplasia can result in a clinical syndrome termed multiple myeloma. It is an uncommon disease, accounting for less than 8% of all hematopoietic tumors in dogs and even less in cats,[5] with rare reports in horses, rabbits, cattle, and pigs.[3,4]

In dogs, multiple myeloma is characterized by a neoplastic proliferation of plasma cells of the bone marrow, which actively secrete large amounts of immunoglobulin (Ig) or portions thereof, termed M component.[6] The bone marrow destruction and subsequent hypergammaglobulinemia contribute to the clinical and pathologic changes often associated with canine multiple myeloma, which includes hypercalcemia, hyperviscosity syndrome, cytopenias, hemorrhage, renal disease, and immunodeficiency.[4,5]

Diagnosis of a multiple myeloma in dogs and cats is based on the presence of bone marrow plasmacytosis, osteolytic bone lesions, and demonstration of serum or urine M component. If osteolysis is not present, multiple myeloma can be diagnosed if marrow plasmacytosis is associated with a progressive increase in the M component. Dogs and cats eventually succumb to the secondary effects of the plasma cell neoplasia, indicating the need for prompt diagnosis and treatment.[7] Often, with ferret patients, the criteria for diagnosing multiple myeloma in dogs and cats

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are not fully met when testing for plasma cell neoplasia. Consequently, there currently is no known criterion for the diagnosis of multiple myeloma in ferrets.

This case series report focuses on 6 ferret malignant plasma cell neoplasia (disseminated plasma cell neoplasia and solitary osseous plasmacytoma) cases, with the goal to identify and describe the common clinical and pathological signs associated with malignant plasma cell neoplasia in this species. A definitive diagnosis of malignant plasma cell neoplasia is made when the tumor spread to other sites or local destruction is identified. Waiting for signs of malignancy may prove to be too late for any effective treatment and indicate the importance of developing criteria for diagnosing a syndrome correlated with malignant plasma cell neoplasia. With a better understanding of the clinical presentation of such cases, it is the authors' hope that further research in this area would provide clarity on antemortem diagnosis and treatment of this destructive neoplasm.

MATERIALS AND METHODS

Medical records of all ferrets that had necropsies performed at Colorado State University Veterinary Teaching Hospital (CSU VTH) from January 2003 to May 2013 were reviewed. Within the necropsy reports, search criteria used were as follows: plasma cell neoplasia, plasma cell tumor, multiple myeloma, myeloma, osteolysis, and osteolytic. Inclusion criteria were a complete medical record and definitive histopathologic diagnosis of a plasma cell neoplasia. Cases were excluded if they contained only an extramedullary plasmacytoma or had incomplete medical records.

Each medical record was reviewed and the following information was obtained: signalment, previous medical history, presenting complaint, clinical signs, diagnostic imaging results (radiography, ultrasonography, and/or computed tomography [CT]), all laboratory diagnostics, and any attempted treatments. Furthermore, all necropsy and histopathology reports were reviewed for accuracy, and the hematoxylin and eosin slides for each case re-examined to confirm accuracy of diagnosis by the same board certified pathologist (author S.H.).

RESULTS

Six ferrets were identified that fit the inclusion criteria, which consisted of 2 spayed females and 4 castrated males, ranging in age from 5.5 to 7.5 years. A description of each case is presented below:

Case 1

A 5.5-year-old castrated male ferret presented to CSU VTH with a sudden onset of hind limb paralysis of 2 days duration. Prior disease history included inflammatory bowel disease, hyperadrenocorticism, and recurrent clostridial enteritis, and treatments included a prescription hypoallergenic feline diet, unilateral adrenalectomy, and amoxicillin, respectively. An abdominal mass was noted on physical examination 2 months before presentation. Abdominal ultrasonography at the time showed a hypoechoic mass on the caudal aspect of the spleen. Cytology of ultrasound-guided aspirates revealed the mass as benign extramedullary hematopoiesis.

Further, 2 months later, the patient was found completely paraplegic with an easily expressed bladder and pain on lumbar spine palpation. An initial diagnostic work-up revealed a moderate mature neutrophilia and elevated phosphorus, total protein, albumin, and globulins (Tables 1 and 2). Radiographic imaging revealed lysis of the third and fourth lumbar vertebrae. Computed tomography (CT) of the lumbar spine revealed an ill-defined enlargement of the soft tissue structures associated with the 3rd and 4th lumbar vertebrae and the right 10th rib, with associated osteolysis. Hypoattenuating lesions within the vertebral bodies were also noted (Fig. 1).

Euthanasia was performed 1 day after initial presentation. On gross necropsy, 2 separate masses were noted, at the 9th and 10th thoracic vertebrae, extending into the right 10th rib and the 3rd and 4th lumbar vertebrae, effacing the vertebral bodies. The spinal cord was soft in this region, consistent with focally extensive malacia. Histopathology confirmed the 2 vertebral masses were compressing the spinal cord, resulting in diffuse malacia and necrosis. The masses were formed by sheets and packets of neoplastic plasma cells supported by a delicate fibrovascular stroma, consistent with malignant plasma cell neoplasia. A densely cellular, infiltrative mass effaced the lumbar skeletal muscle and medullary cavity of the thoracic rib. A small number of similar neoplastic cells were found multifocally throughout the myocardium, indicative of metastasis. Other findings were consistent with chronic gastrointestinal disease.