

CASE REPORT

Plasma Cell Sarcoma in a Cat

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Abstract

Lytic lesions occurring in conjunction with plasma cell sarcoma (multiple myeloma) have rarely been reported in cats.

A plasma cell sarcoma was diagnosed in a 13 year old castrated male Siamese cat with hind limb paresis resulting from osteolysis of the second lumbar vertebra. Serum electrophoresis showed a monoclonal gammopathy. A uniform population of plasma cells was found in and around the second lumbar vertebra and in the bone marrow of the femora, humeri, pelvis and the fifth lumbar vertebra. The neoplastic cells were identified as IgA and kappa chain specific by direct immunofluorescence.

Key words: plasma cell sarcoma, cat.

Résumé

Rapport d'un plasmocytosarcome, chez un chat

La littérature vétérinaire contient très peu de rapports qui mentionnent la présence de lésions lytiques attribuables à un plasmocytosarcome, i.e. un myélome multiple, chez le chat.

Les auteurs diagnostiquèrent ce néoplasme chez un Siamois castré et âgé de 13 ans qui affichait une parésie des membres postérieurs, imputable à l'ostéolyse de sa deuxième vertèbre lombaire. L'électrophorèse du sérum de ce chat révéla une gammopathie monoclonale. Le corps et la périphérie de la deuxième vertèbre lombaire, ainsi que le moelle des fémurs, des humérus, du bassin et de la cinquième vertèbre lombaire, renfermaient un grand nombre de plasmocytes uniformes. L'immunofluorescence directe démontra que le cytoplasme de ces cellules néoplasiques contenait des IgA et une chaîne kappa spécifique.

Mots clés: plasmocytosarcome, chat.

Introduction

Plasma cell sarcoma (multiple myeloma) is a neoplastic proliferation of plasma cells which usually synthesize a monoclonal immunoglobulin and/or one of its constituent polypeptide chains (1).

This report describes a cat with an IgA secreting plasma cell sarcoma and osteolysis of the second lumbar vertebra. Plasma cell sarcoma has been infrequently reported in cats (2,3) and in only two of these cases were lytic skeletal lesions present (4,5). Osteolytic bone lesions occur in the majority of cases of multiple myeloma in man (1,6) and in approximately half of the canine cases (5).

Feline plasma cell sarcomas usually secrete IgG (2-5,7,8), although secre-

tion of IgA and IgM has been documented in single cases (5,8). In man, approximately 60% of multiple myelomas secrete IgG, 15 to 20% produce IgA and 10 to 15% form IgM (1). In a study of 40 canine cases, plasma cell sarcomas secreting IgG, IgA and IgM were reported with approximately equal frequencies (5).

History

A 13 year old castrated male Siamese cat was referred to the Western College of Veterinary Medicine, University of Saskatchewan, Saskatoon, Saskatchewan, with a history of inappetence and progressive hind limb paresis of one month's duration.

Clinical Findings

Radiographic examination revealed an ill-defined lytic lesion of the second

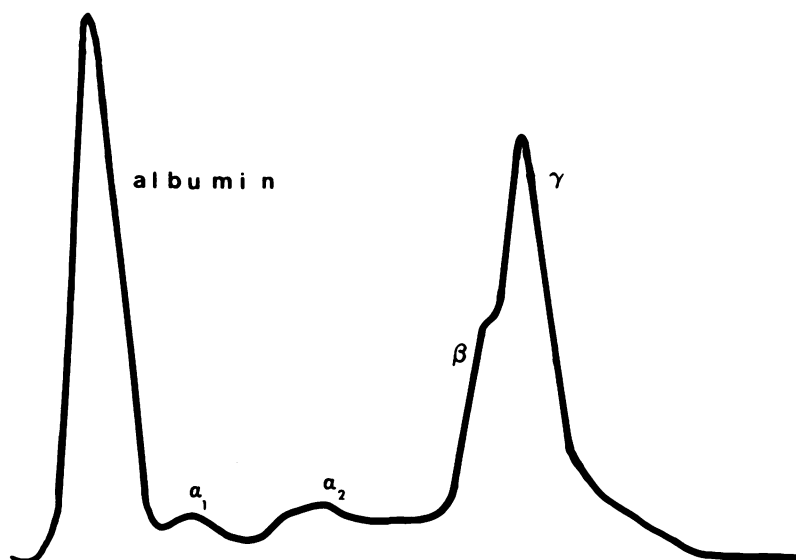


FIGURE 1. Serum protein electrophoresis from a cat with plasma cell sarcoma. Total protein 115 g/L, albumin 41 g/L, α_1 6 g/L, α_2 9 g/L, β 22 g/L and γ 37 g/L.

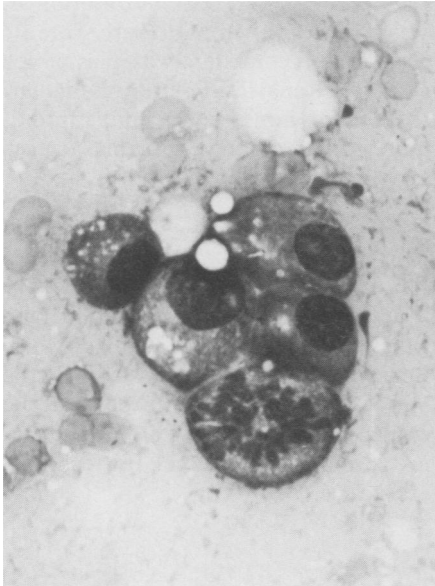


FIGURE 2. Neoplastic plasma cells and mitotic figure in an impression smear from an extradural mass associated with the second lumbar vertebra in a cat with plasma cell sarcoma. X1,000.

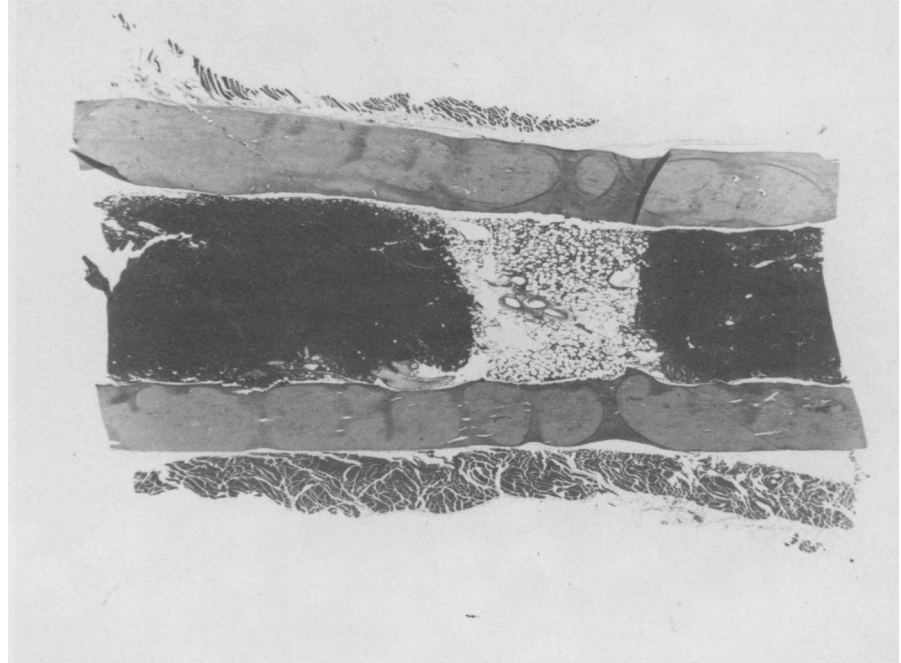


FIGURE 3. Sheets of neoplastic plasma cells in the femoral bone marrow of a Siamese cat with plasma cell sarcoma. X3.5.

lumbar vertebra involving a large portion of the vertebral body, the floor of the spinal canal and the left lamina. Serum protein concentration was markedly increased, primarily as the result of an elevation in gamma globulins (Figure 1). Other hematological and biochemical parameters were within normal limits.

A 1.0 cm by 1.0 cm extradural mass extending cranially from the second lumbar vertebra was exposed by dorsal laminectomy. Cytological examination of a sample taken from this vertebral body (Figure 2) showed a homogeneous population of plasma cells. Low numbers of these plasma cells were binucleate and occasional mitotic figures were observed. A diagnosis of plasma cell sarcoma was made and the cat was euthanized.

Gross Necropsy Findings

The significant abnormalities were restricted to the skeletal system. The marrow of the femora and humeri contained soft, dark red gelatinous patches at the epiphyses and metaphyses (Figure 3). The second and fifth lumbar vertebrae and the bones of the pelvis were similarly affected. Considerable bony destruction of the second lumbar vertebra was evident.

Histopathological Findings

The dark red, gelatinous areas of bone marrow were composed of nodules and sheets of large, occasionally binucleate, plasma cells. Numerous small blood vessels were scattered among the plasma cells. Plasma cells filled the marrow cavity of the second lumbar vertebra and, in areas, replaced cortical bone. Neoplastic cells had also infiltrated the muscle surrounding the second lumbar vertebra, resulting in degeneration of skeletal muscle fibers. Histological evidence of bone destruction was not observed at sites other than the second lumbar vertebra. Chronic interstitial nephritis was also found.

Immunohistochemical Findings

Cytoplasmic immunoglobulin was demonstrated on formalin fixed, paraffin embedded sections of femoral bone marrow (9). Five micron sections were mounted on glass slides, deparaffinized through two changes of xylol, rehydrated through graded concentrations of ethanol and rinsed in distilled water. The sections were digested for two hours at 37°C in a solution containing 0.1% CaCl₂ and 0.1% trypsin (Type II, Sigma Chemical Co., St.

Louis) adjusted to pH 7.8 with 1 N NaOH. The slides were rinsed and stored in phosphate-buffered saline (PBS), (pH = 7.8), overnight at 4°C.

Antifeline IgG (γ chain), IgM (μ chain), IgA (α chain) and antihuman kappa chain and lambda chain antisera (Pel-freeze Biologicals, Rogers AR) were diluted 1/10 in PBS. Digested sections were flooded with 0.05 mL heavy or light chain specific diluted antisera and incubated for 30 minutes in a humid chamber. Following three 20 minute washes in PBS, the sections were reincubated with fluorescein conjugated antirabbit or antigoat immunoglobulin antiserum as appropriate. The slides were then given three 20 minute washes, mounted in polyvinyl alcohol medium (10) and examined by fluorescent microscopy (Leitz Ortholux, Canada).

There was a bright granular cytoplasmic staining of neoplastic bone marrow cells incubated with rabbit antifeline IgA (α chain) fluorescein-conjugated antiserum (Figure 4). Similar staining was obtained with rabbit antihuman kappa chain antiserum. There was no labelling of the sections by antifeline IgG (γ chain), IgM (μ chain) or antihuman lambda chain reagents.

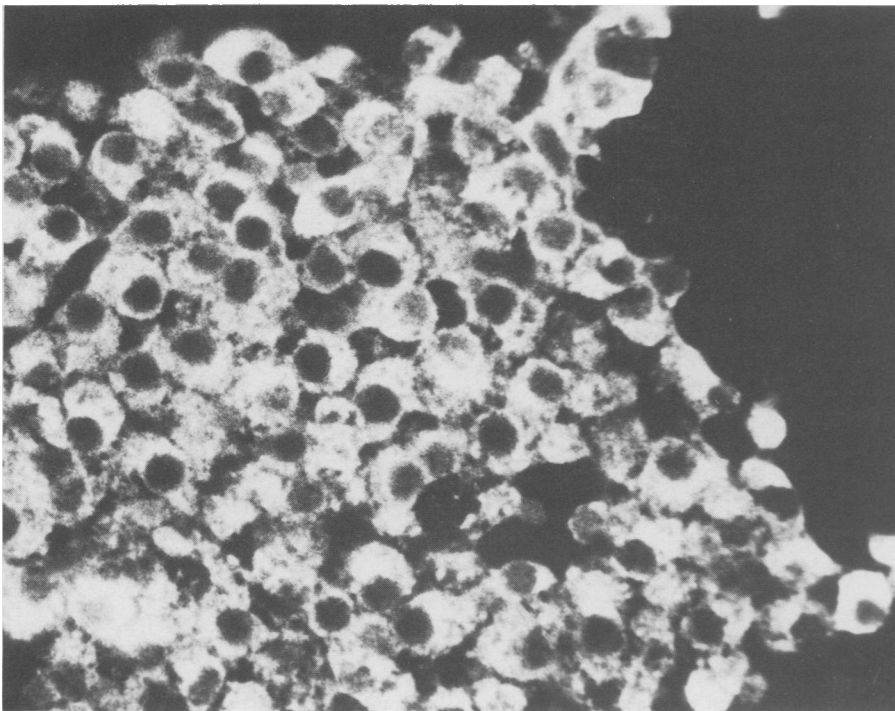


FIGURE 4. Direct immunofluorescence staining of neoplastic bone marrow cells with antifeline IgA (α chain) antisera in a cat with plasma cell sarcoma. X240.

Discussion

Plasma cell sarcoma was diagnosed in this cat based on the presence of a lytic lesion of the second lumbar vertebra, a monoclonal gammopathy and an uncontrolled proliferation of plasma cells in the bone marrow. The demonstration of cytoplasmic immunoglobulin of only IgA kappa chain specificity confirmed the monoclonal nature of the neoplasm.

The bone lesions found in association with plasma cell sarcoma usually originate as focal medullary plasma cell accumulations which enlarge and destroy cancellous and then cortical bone (1). Although bone marrow infiltration with neoplastic plasma cells has been present in most feline cases (2,3,8,11), only two other cats have been reported to have lytic skeletal lesions (4,5).

Hypercalcemia is frequently present in humans with multiple myeloma (1). In contrast, elevated serum calcium has not been documented in cats with plasma cell sarcoma, including the cat in the present report. Hypercalcemia is not commonly detected in dogs with plasma cell sarcoma (4). Hypercalcemia may be the result of an osteoclast-stimulating polypeptide, produced

locally by neoplastic plasma cells (12), or due to bone destruction resulting from direct extension of the tumor (1).

The immunoglobulin which is produced in individual cases of plasma cell sarcoma is usually monoclonal and may belong to any one of the immunoglobulin classes, although in cats (2,8) and in man (1) IgG has been identified most commonly. IgA production has been documented in one cat other than the animal described herein (8). In some feline, canine, and human patients heavy or light immunoglobulin chains may be formed, either along with complete immunoglobulins, or, more rarely, alone. In the former instance the heavy or light chains are always identical to those found in the complete immunoglobulin (1). The free light chains, or Bence Jones proteins, are of low molecular weight and are excreted in the urine.

Renal lesions may occur in association with plasma cell sarcoma as a result of tubular damage secondary to Bence Jones proteinuria (5). Bence Jones proteins have been detected in most feline plasma cell sarcoma cases (2,4,5,8) and a variety of renal lesions have been

reported (2,4,8,11). Urine from this cat was not examined and there were no renal lesions consistent with plasma cell sarcoma. Renal lesions are present in 60 to 80% of humans (1) and approximately 50% of dogs with plasma cell sarcoma (13).

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