

Hematologic profile in a Persian cat with osteosarcoma

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ABSTRACT: A three-year-old Persian cat presented to the West Java Provincial Veterinary Hospital with swelling in the left front leg and was diagnosed with osteosarcoma. This study aimed to evaluate the impact of osteosarcoma on the haematological profiles of cats. Humerus amputation is the standard treatment. A detailed haematological assessment was performed, including red blood cell count, white blood cells count, lymphocytes, monocytes, immature cells, mid-sized cells, granulocytes, haemoglobin, haematocrit, MCV, MCH, MCHC, and platelets. The findings revealed leukocytosis, granulocytosis, hypochromic macrocytic anaemia, and thrombocytopenia, indicating that osteosarcoma may disrupt the normal blood component production.

Keywords:

cat, cytology, haematology, osteosarcoma, radiography

INTRODUCTION

Osteosarcoma, the most common primary bone cancer in cats, accounts for 70%–80% of these malignancies (Nakano *et al.* 2022). It often arises without clear causes, though factors like prior injuries, bone infections, radiation exposure, DNA mutations, and genetic predispositions may contribute to its development (Morrison 2012). Radiological assessments are typically used for diagnosis, with surgery being the primary treatment for removing the affected bone (Cinti *et al.* 2024).

Despite many studies validating simple haematological tests in cancer diagnostics, their role in osteosarcoma is unclear. These tests, which are essential for refining cancer risk assessments and surpassing the NICE-recommended 3% exploration threshold, have limited applicability for osteosarcoma detection (Watson *et al.* 2019). This study analysed the haematological profile of a cat diagnosed with osteosarcoma using radiographic evidence.

CASE

Signalment and Anamnesis: A three-year-old Persian cat presented with a two-month history of persistent swelling in the left front leg, reduced appetite, and respiratory distress including mouth breathing. The incomplete vaccination history of the cat may have predisposed the patient to complications. **Physical Examination:** The cat showed discomfort, holding its swollen and tender left leg up. Despite this, its rectal temperature was normal at 38.8 °C. **Radiological Findings:** Preliminary radiographs revealed a substantial ulnar lesion with permeative margins, mottled bone, and cortical destruction with a spiculated periosteal

reaction, suggestive of an aggressive bone pathology. Subsequent imaging at 2 months demonstrated progressive osteolysis (Figure 1). **Cytological and Haematological Findings:** Cytology revealed a cluster of dysplastic tumour cells with oval osteoblasts on a haemorrhagic background, exhibiting anisokaryosis, hyperchromasia, and a high nucleus-to-cytoplasm ratio, indicative of malignancy (Figure 2). Haematology revealed leukocytosis, granulocytosis, anaemia, and thrombocytopenia, suggesting a systemic

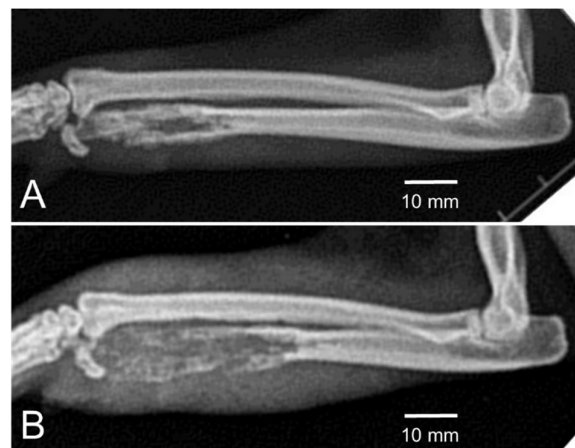


Figure 1 Radiographic finding on left front leg os ulna of a Persian cat with osteosarcoma. (A) X-ray results of the lateral cat on initial imaging, (B) X-ray results of the lateral cat after 2 months.

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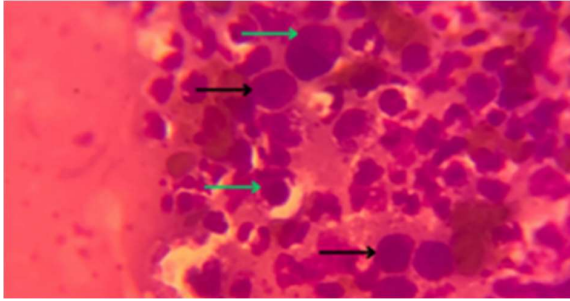


Figure 1 The cytology of a cat with osteosarcoma showed a cluster of dysplastic tumor cells, which showed the presence of osteoblasts (green arrow) and anisokaryosis (black arrow).

disease impact (Table 1). **Differential and Definitive Diagnosis:** Clinical and diagnostic findings initially suggested osteomyelitis; however, radiographic and cytological evidence confirmed osteosarcoma. **Prognosis:** Fausta-Dubius. **Treatment:** Amputation is advised to prevent cancer spread, alleviate pain, and improve the postoperative quality of life.

RESULTS AND DISCUSSION

Physical examination, radiographic analysis, and cytology confirmed osteosarcoma in the left front leg ulna. Cytology revealed small, oval-to-round cells with high nucleus-to-cytoplasm ratios, hyperchromatic nuclei, perinuclear vacuoles, focal pleomorphism, giant cell tumours, and osteoclastic giant cells, indicating aggressiveness (Orosz & Athanasou 2017). Osteosarcomas exhibit aggressive bone progression, causing pain, swelling, and functional impairments (Beird *et al.* 2022).

Haematological analysis showed reduced RBC count, haemoglobin, haematocrit, thrombocytopenia, leukocytosis, and granulocytosis (Table 1), indicating inflammation and hypochromic macrocytic anaemia with increased MCV, typical of chronic diseases such as osteosarcoma (Ma *et al.* 2023). Anaemia results from impaired iron utilisation and decreased RBC production, which are affected by IL-6 and STAT3 overexpression, elevated hepcidin, reduced serum iron, and erythropoiesis (Zlatanova *et al.* 2019). This inhibits erythropoietin synthesis and erythrocyte production, thereby worsening the condition (Grigorakaki *et al.* 2011).

Table 1 Hematology examination results from a Persian cat with osteosarcoma at left front leg os ulna.

Blood Parameters	Normal Value	Results
White Blood Cells ($\times 10^3/\mu\text{L}$)	5.5-19.5	20.5 ↑
Lymphocytes ($\times 10^3/\mu\text{L}$)	8-7	3.5 ↓
Mid-sized cells ($\times 10^3/\mu\text{L}$)	0-1.9	0.5
Granulocytes ($\times 10^3/\mu\text{L}$)	2.1-15	16.5 ↑
Red Blood Cell ($\times 10^6/\mu\text{L}$)	4.6-10	3.56 ↓
Hemoglobin (g/dL)	9.3-15.3	5.6 ↓
Hematocrit (%)	28-49	18.8 ↓
MCV - Mean Corpuscular Volume (fL)	39-52	52.9 ↑
MCH - Mean Corpuscular Haemoglobin (pg)	13-21	15.7
MCHC - Mean Corpuscular Haemoglobin Concentration (g/dL)	30-38	29.7 ↓
Platelets ($\times 10^3/\mu\text{L}$)	100-514	84 ↓

Osteosarcoma-derived G-CSF stimulates leukocytosis, particularly granulocytosis, fostering neutrophil growth and survival (Roberts 2005). Oncogenesis disrupts haemostasis and causes thrombocytopenia via increased platelet consumption, reduced production, immune destruction, or sequestration (Grindem *et al.* 1994). These haematological alterations underscore the intricate interplay between cancer and the systemic pathophysiological responses (Childress 2012).

CONCLUSION

Haematology profile analysis of a cat with osteosarcoma revealed leukocytosis, granulocytosis, hypochromic macrocytic anaemia, and thrombocytopenia. These haematological abnormalities, coupled with specific clinical symptoms, may indicate early osteosarcoma.

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