



Lymphosarcoma in an alpaca

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Abstract — A 16-month-old, female alpaca presented with a 24-hour history of anorexia and depression. On necropsy, it was found that the liver was grossly enlarged and the cortices of both kidneys contained multifocal lesions. Histologic examination of these lesions and other tissues revealed infiltration with lymphocytic cells, a finding consistent with lymphosarcoma.

Résumé — **Lymphosarcome chez un alpaga.** Un alpaga femelle âgée de 16 mois a été présentée suite à une anorexie et une dépression de 24 heures. À la nécropsie, le foie présentait un volume sensiblement augmenté et le cortex des 2 reins contenait des lésions multifocales. L'examen histologique de ces lésions et d'autres tissus a révélé une infiltration de cellules lymphocytaires compatibles avec un diagnostic de lymphosarcome.

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A 16-month-old female alpaca with no history of previous illness was presented for diagnosis and treatment after 24 h of anorexia and depression. One day earlier, the animal's temperature had been 38.5°C (reference range, 37.5°C to 38.6°C (1)), and the owners had treated her with sulbactam (3.75 mg/kg bodyweight (BW)) and ampicillin (7.50 mg/kg BW) (Synergistin; rogar/STB, London, Ontario).

The alpaca was depressed and lethargic, and had a body condition score of 1/5, a rectal temperature of 39.0°C, and an elevated heart rate of 100 beats per minute (bpm) (reference range, 60 to 80 bpm, extrapolated from data for the llama (2)). The respiratory rate was also elevated, at 40 respirations per minute (rpm) (reference range, 10 to 30 rpm, extrapolated from data for the llama (2)). The mucous membranes were pale, and the capillary refill time was delayed (3.5 s). The animal was approximately 7% dehydrated. Crackles were audible by auscultation over the left dorsocaudal lung field. The abdomen appeared distended and rigid. Scant feces were found on rectal examination. A firm mass, 7 cm in diameter, was palpable per rectum in the ventral abdomen. Although the first compartment was normally filled, the content had a gritty texture. The kidneys were normal, both in size and texture. Two unsuccessful attempts were made at abdominocentesis, using a 1.5-inch, 18-gauge needle, on the midline, 3 cm caudal to the umbilicus. The owners reported the animal

had voided urine, but none was collected during the examination.

Initial differential diagnoses included intestinal obstruction, abscessation, hematoma, neoplasia, and peritonitis. Blood was drawn for a complete blood cell count (CBC) and a serum biochemistry profile. A stomach tube was passed into the first compartment, 250 mL of mineral oil and 1 L of an oral electrolyte solution (Oralyte; PVU, Calgary, Alberta) were administered. The antibiotic therapy started by the owner was continued, q24h. The prognosis appeared poor, and 12 h later the animal died and was submitted for necropsy.

The results of the CBC showed mild hemoconcentration; leukocytosis, characterized by lymphocytosis and monocytosis; and numerous lymphoblasts. The serum biochemistry profile showed increases in blood urea nitrogen, creatinine, and phosphorus, with hyponatremia, hypochloremia, and hypoproteinemia. The hypoproteinemia was attributed primarily to hypoalbuminemia, as gamma globulin was within normal range (Table 1).

At necropsy, the alpaca was thin and weighed 47.9 kg (reference mean, 55 kg (5)). The vessels of the mesentery and omentum were prominent, and fat was absent. The liver was grossly enlarged, weighing 8.2 kg, and occupied approximately 40% of the abdominal cavity. Both the capsule and cut surface of the liver were diffusely red and tan with a nutmeg-like pattern. Multifocal, random, pale nodules, 4 mm or less in diameter, were found in the cortices of both kidneys. The bronchioles were filled with white foam. No other significant abnormalities were found.

Histologically, the liver was infiltrated with lymphoblasts and some mixed leukocytes. The sinusoids and periportal areas showed foci of necrosis with a loss of normal liver architecture. Examination of the adrenal glands, kidneys, and mesenteric lymph nodes revealed

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James Irwin will receive a copy of *Saunders Comprehensive Veterinary Dictionary* courtesy of Harcourt-Brace Canada.

Table 1. Hematology and serum biochemistry in a 16-month-old female alpaca with lymphosarcoma

Variable	Case values	Reference range
Hematology		
Hematocrit (L/L)	0.42	0.30–0.42 (3)
WBC ($\times 10^9$ cells/L)	38.6	6.0–20.9 (3)
Lymphocytes ($\times 10^9$ cells/L)	15.8	2.1–6.8 (3)
Monocytes ($\times 10^9$ cells/L)	3.47	0–0.6 (3)
Serum biochemistry		
Urea nitrogen (mmol/L)	74.5	5.0–12.4 (4)
Creatinine (μ mol/L)	632	128–288 (4)
Phosphorus (mmol/L)	3.42	0.6–3.2 (4)
Sodium (mmol/L)	127	141–165
Chloride (mmol/L)	78	101–117
Total protein (g/L)	48	54–75
Albumin (g/L)	23	25–45
γ -Globulin (g/L)	25	15–41

WBC — white blood cell; γ -globulin — gamma globulin

a massive infiltration of lymphocytic cells. There was a moderate increase in cellularity of the spleen, attributed to hematopoiesis within the red pulp. Heart, lung, and skin showed no significant histologic lesions. On the basis of the gross lesions, CBC, and histological findings, a diagnosis of lymphosarcoma was made.

Although lymphosarcoma is the most commonly reported neoplasm in New World camelids, it is a rare disease (6). Lymphosarcoma has been described previously in both the llama (6,7) and the alpaca (6). In a study of New World camelid admissions at Colorado State University, Veterinary Teaching Hospital, 5 of 1156 admissions (0.4%) were diagnosed with lymphosarcoma (6). The median age of onset was 3 y, with a range of 4 m to 15 y (6). The most common presenting complaints were anorexia and depression. Clinical signs in these animals included tachypnea, tachycardia, emaciation, and an absence of borborygmi (6). Lymphadenopathy was a frequent finding, affecting mandibular, retropharyngeal, superficial cervical, iliac, popliteal, and supramammary lymph nodes (6). Palpation per rectum sometimes revealed an abdominal mass, which usually had a homogenous appearance on ultrasound (6). Frequent findings on CBC included anemia and hypoproteinemia (6). A left shift in the white blood cell count was a consistent finding, and lymphocytosis, as was found in this case, was unusual (6). Typical biochemical findings included azotemia and hypoalbuminemia (6), as in this case, and hyperglycemia and hypokalemia (6), which were not observed in this case.

Treatment of lymphosarcoma in New World camelids has not been thoroughly investigated. Chemotherapy has been attempted by using dexamethasone followed by

cyclophosphamide and prednisolone. One animal responded to therapy for only 2 d (6). Euthanasia is often the most humane option.

The common sites for metastasis of lymphosarcoma include lymph nodes, liver, renal cortex, lung, and heart (6). Subpleural, perivascular, and peribronchial infiltrates commonly occur in the lung (6) but were not found in this case. Liver infiltrates may be random and extensive, often destroying lymph node architecture (6), as in this case.

The pathogenesis of lymphosarcoma in New World camelids is unknown at this time. Electron microscopy of tumor tissue has failed to identify viral particles (6). A serologic study of Peruvian llamas also failed to detect the bovine leukemia virus (8). It is likely that genetic factors play a role in the pathogenesis of this disease, as is suspected in non-BLV-associated lymphoma in cattle. Until more cases of lymphosarcoma in the alpaca have been studied, it is unlikely that the etiology will be identified.

As the New World camelid industry continues to grow, information regarding uncommon diseases becomes important to the veterinary practitioner. Although lymphosarcoma is rare in the alpaca, it may be a differential diagnosis in animals with anorexia and depression. Presently, there are few therapeutic options for the individual animal. However, diagnosing lymphosarcoma may increase our understanding of the etiology of this disease in camelids, and perhaps provide better methods of treatment and prevention.

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