SPONTANEOUS PULMONARY HEMANGIOSARCOMA IN A NORWAY RAT (*RATTUS NORVEGICUS*)

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Abstract

A second parity, 1-year-old female Norway rat (*Rattus norvegicus*) presented for veterinary evaluation 5 weeks postpartum with a progressively decreased appetite, weight loss, lethargy, and labored breathing. On physical examination, the animal was in fair body condition, dyspneic, and dehydrated. Owing to a poor prognosis, the owner opted for palliative care for the animal, declined further diagnostic testing, and requested for the rat to be discharged from the hospital. The following day the animal was found dead in its cage, and the body was submitted for necropsy. Gross observations included numerous, variably sized, soft, dark red pulmonary nodules concurrent with hemothorax and hemopericardium. Microscopically, the pulmonary architecture was effaced by nodules of variably sized, irregular, vascular channels lined with neoplastic endothelial cells. The cytoplasm of neoplastic cells in the lung was immunohistochemically positive for von Willebrand factor (i.e., factor VIII–related antigen) and was more intensively and more often positive for vascular endothelial growth factor as compared with nonneoplastic cells. Ultrastructurally, vascular channels were formed by spindloid neoplastic cells with elongated, fused, and interdigitated processes. Based on these findings, a diagnosis of spontaneous pulmonary hemangiosarcoma was made in this Norway rat.

Key words: electron microscopy; hemangiosarcoma; immunohistochemistry; Norway rat; pulmonary

This case report describes the clinical signs, gross necropsy findings, histopathologic findings, immunohistochemical profile, and ultrastructural findings of a spontaneous pulmonary hemangiosarcoma in a Norway rat (*Rattus norvegicus*). The animal in the present case was a 1-year-old female companion Norway rat. Clinical signs were first observed 4 to 5 weeks following delivery of the rat's second litter and included a progressively decreased appetite, weight loss, labored breathing, dehydration, and lethargy. Per the owner's request, no diagnostic tests were performed. Subcutaneous fluids, meloxicam (1.0 mg/kg orally, once, Metacam; Boehringer Ingelheim Vetmedica, Inc, St. Joseph, MO USA), 2 doses of doxycycline (2.5 mg/kg orally, twice; Pfizer, Inc, New York, NY USA), and enrofloxacin (5 mg/kg, subcutaneously, once, Baytril; Bayer Corp, Shawnee, KS USA) were administered. The following day the animal was found dead in its cage, and the body subsequently submitted for pathologic evaluation.

At necropsy, 5.0 mL of blood was identified within the thoracic cavity along with a moderate amount of red, milky fluid in the tracheal lumen. The lungs contained numerous 1.0- to 5.0-mm-diameter, nodular, soft, red and purple masses scattered throughout and replacing much of the

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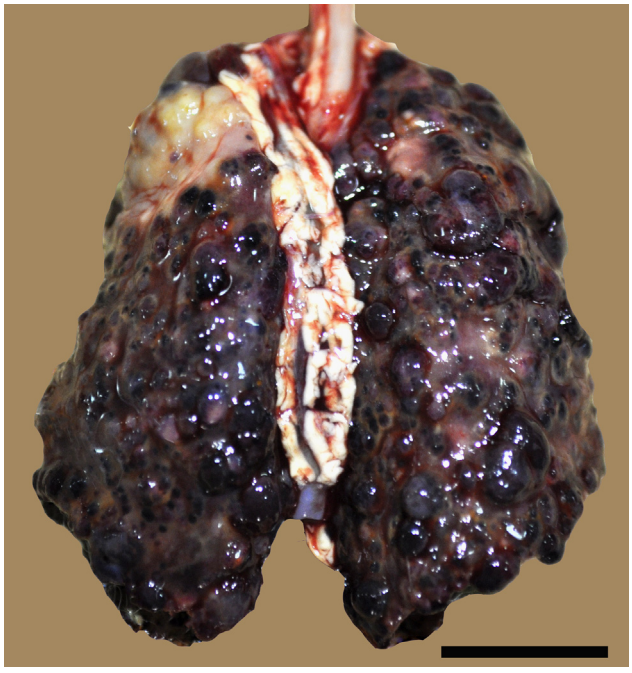

FIGURE 1. Gross appearance of a multinodular pulmonary hemangiosarcoma in a Norway rat. The lung parenchyma has been replaced by numerous, 1.0- to 5.0-mm-diameter, nodular, soft, red and purple masses, with almost no discernible normal tissue. Bar, 1 cm.

parenchyma (Fig. 1). The pericardial sac contained approximately 1.0 mL of blood. The heart was globoid, and the left and right free walls were mildly thickened. The left ovary was diffusely dark brown and contained corpora lutea. A small amount of brown mucoid material was observed in the small intestine, whereas the large intestine

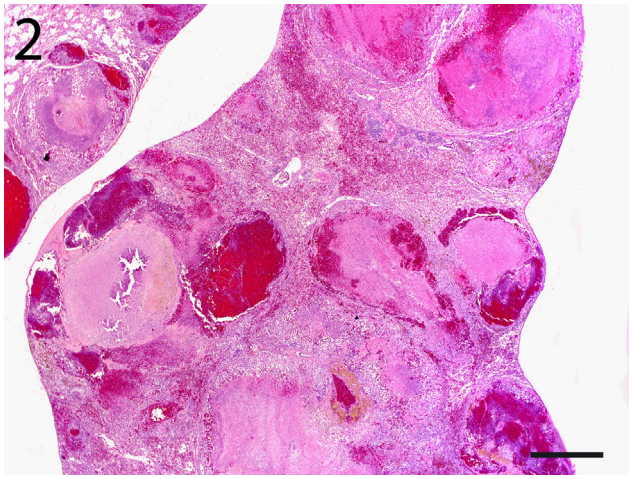

FIGURE 2. Hematoxylin and eosin. Neoplastic cells form irregularly sized, blood-filled vascular channels, often separated by thin collagen bundles. Bar, 50 μm.

was devoid of content. Representative tissues, including the heart, lung, brain, spinal cord, peripheral nerve, liver, kidney, adrenal gland, pancreas, stomach, small intestine, large intestine, lymph node, uterus, ovary, eye, salivary gland, and Harderian gland were collected and placed in 10% neutral-buffered formalin.

Following formalin fixation, tissues were routinely processed, embedded in paraffin, sectioned at 5 μm, mounted on glass slides, and stained with hematoxylin and eosin. Histologic examination of the lungs revealed many variably sized, poorly circumscribed, unencapsulated nodules consisting of neoplastic cells that invaded and replaced approximately 75% of the lung parenchyma. These cells formed irregularly sized, blood-filled vascular channels that were often separated by thin bundles of collagen (Fig. 2). The pleomorphic population of neoplastic cells had nondistinct borders; cells had a moderate amount of pale, eosinophilic, homogenous cytoplasm, and prominent, hyperchromatic round to ovoid nuclei with finely stippled chromatin and 1 or 2 eccentric, deeply basophilic nucleoli with rare binucleated cells. The mitotic rate was 9 mitotic figures per 10 ×400 fields, with anisocytosis and anisokaryosis noted in moderate amounts within the tissue. In multiple normal vessels, fibrin thrombi were observed and neoplastic cells infiltrated and penetrated the tunica intima of vessel walls. Neoplastic vascular channels were surrounded and infiltrated by multifocal to coalescing, dense aggregates of viable and degenerate inflammatory cells primarily comprising lymphocytes and plasma cells with many alveolar and hemosiderin-laden macrophages and fewer neutrophils. Variable numbers of scattered erythrocytes, extracellular hematoidin and hemosiderin, and multiple necrotic foci were also within these areas. Nonaffected alveoli often revealed histopathologic evidence of edema.

Other abnormal microscopic findings were found in the pericardium, liver, and mandibular lymph node. The dorsal aspect of the pericardium was edematous and had focally extensive inflammation consisting of lymphocytes and plasma cells, with fewer neutrophils. The liver had diffuse lipidosis, congestion, and occasional aggregates of perivascular and periportal lymphocytes. Lymphoid follicles within the mandibular lymph node were poorly defined and contained moderate numbers of plasma cells. Viable and degenerate neutrophils were scattered throughout the medullary sinuses.