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What Is Your Diagnosis?

In collaboration with the American College of Veterinary Radiology

History

A 10-year-old 32-kg castrated male Golden Retriever was evaluated for left pelvic limb lameness following a left tibial plateau leveling osteotomy (TPLO) performed 19 weeks earlier. On physical examination, a large, firm, immobile mass was noted in the cranial abdomen, most prominently on the left side. There was no lameness detected on gait analysis. The left stifle joint had mild crepitus and periarticular fibrosis, consistent with a previous TPLO and previously diagnosed osteoarthritis.

Thoracic and stifle radiography was performed (not shown), and in the included cranial portion of the abdomen, marked, diffuse loss of serosal detail occurred, and a mass effect resulting in dorsal displacement of the small intestines was visible. No additional radiographs were obtained, as it was elected to perform CT to better assess the mass. Pre- and postcontrast abdominal and thoracic CT was performed **(Figure 1)**.

Formulate differential diagnoses, then continue reading.

Diagnostic Imaging Findings and Interpretation

Abdominal CT revealed a large (approx 25 X 22 X 14-cm), irregularly marginated heterogeneous mass with a cavitated, fluid-filled center and regions of amorphous mineralization **(Figure 2)**. The origin of the mass was difficult to definitively identify, though it was suspected to have arisen from the tail of the spleen. The mass displaced the stomach cranially, the small intestines caudolaterally, and the spleen and colon dorsally. A small amount of free peritoneal fluid was observed adjacent to the liver and intestines as well as a linear region of fluid attenuation ventral to the mass dissecting into the peritoneal fat.

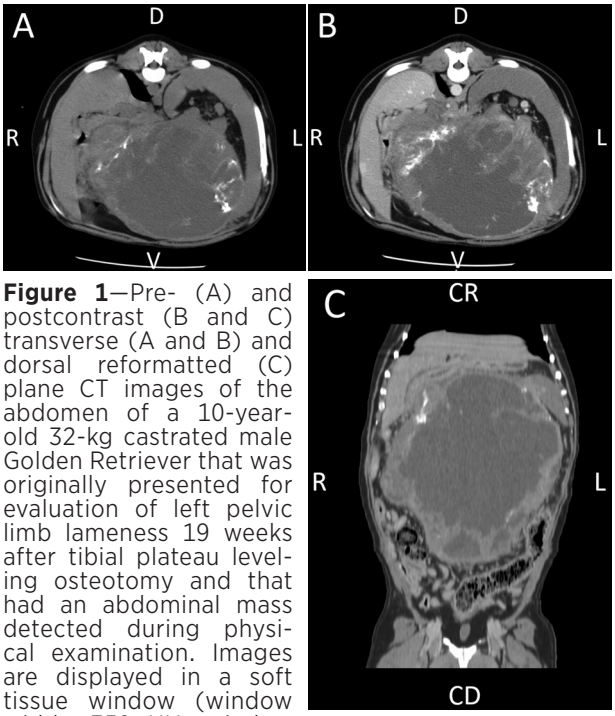

Figure 1—Pre- (A) and postcontrast (B and C) transverse (A and B) and dorsal reformatted (C) plane CT images of the abdomen of a 10-year-old 32-kg castrated male Golden Retriever that was originally presented for evaluation of left pelvic limb lameness 19 weeks after tibial plateau leveling osteotomy and that had an abdominal mass detected during physical examination. Images are displayed in a soft tissue window (window width, 350 HU; window level, 40 HU) with 0.62-mm slice thickness. A and B—Images were obtained at the level of T12. C—The image was obtained at the level of the pubic symphysis. CD = Caudal. CR = Cranial. D = Dorsal. L = Left. R = Right. V = Ventral.

The hepatic parenchyma was normal. The gallbladder was mildly distended with a small amount of mineral-attenuating sediment within the lumen. On thoracic CT, the sternal lymph nodes were mildly enlarged and rounded. The lungs were normal with no evidence of pulmonary metastasis.

The primary differential diagnosis for the mass was a primary splenic neoplasm such as hemangiosarcoma or another malignant neoplasia. A splenic hematoma, extramedullary hematopoiesis, lymphoid hyperplasia, or mesenteric mass was considered less likely. Mild peritoneal effusion was deemed the most likely cause of the linear region of fluid attenuation ventral to the mass; however, mild concurrent peritonitis, steatitis, or, less likely, peritoneal metastasis could not be definitively ruled out by imaging alone. Differential diagnoses for the sternal lymph node enlargement included reactive lymphoid hyperplasia and metastasis of the abdominal mass.

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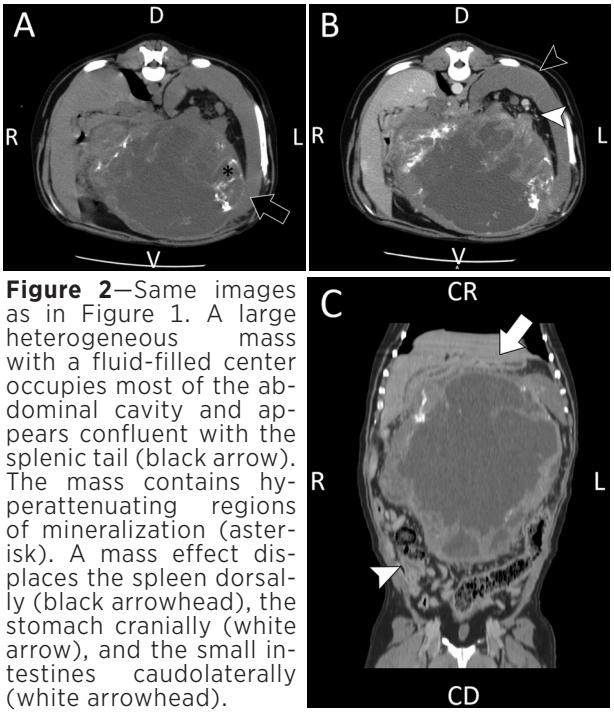

Figure 2—Same images as in Figure 1. A large heterogeneous mass with a fluid-filled center occupies most of the abdominal cavity and appears confluent with the splenic tail (black arrow). The mass contains hyperattenuating regions of mineralization (asterisk). A mass effect displaces the spleen dorsally (black arrowhead), the stomach cranially (white arrow), and the small intestines caudolaterally (white arrowhead).

Treatment and Outcome

Exploratory laparotomy was performed, and a large, irregular, highly vascularized mass arising from the tail of the spleen was found. There was trace serosanguinous free fluid within the peritoneal cavity. A total splenectomy was performed, and the mass was removed in its entirety. Due to the large amount of unoccupied space within the peritoneal cavity following excision of the mass, a prophylactic right-sided incisional gastropexy was performed. The remainder of the exploratory laparotomy was within normal limits. The dog recovered without any complications and was discharged from the hospital 2 days postoperatively.

Histopathology of the splenic mass revealed long spindle and stellate cells arranged in tight sheets and bundles surrounded by collagenous and mucoid stroma. There was no evidence of vascular differentiation. Multifocal regions of osteoid were observed forming trabeculae of poorly mineralized bone with osteoclast infiltrates. These results supported the diagnosis of a pleomorphic splenic stromal cell sarcoma. The cell of origin of the mass could not be definitively determined; however, most of the mass was consistent with a peripheral nerve sheath tumor, whereas other regions resembled low-grade osteosarcoma. Immunohistochemical analysis to rule out hemangiosarcoma or histiocytic sarcoma was offered; however, the owner declined. An oncology consultation to discuss chemotherapy was also recommended but not pursued by the owner. The dog was euthanized 2 months after splenectomy due to the development of anemia and a second intra-abdominal mass.

Comments

Splenomegaly is common in dogs, with malignancies representing 43% (214/500) of these lesions.[1,2] Most malignant splenic masses in dogs are hemangiosarcoma, which account for 57% (122/214) of neoplasms.[1] Other splenic malignancies include fibrosarcoma, leiomyosarcoma, lymphosarcoma, liposarcoma, and histiocytic sarcomas.[1] Although many splenic masses are incidentally discovered, clinically affected patients can present with signs that vary from mild lethargy to collapse, as can be seen with acute hemorrhage from mass rupture. Early detection of solitary splenic lesions via imaging examinations can allow for earlier intervention, which may prevent effects secondary to compression of surrounding visceral structures by the mass and may avoid the potential for life-threatening hemorrhage.

Diagnostic imaging modalities such as radiography, abdominal ultrasonography, and CT are pivotal in identifying and characterizing splenic masses. On abdominal radiography, focal splenic lesions may appear as discrete masses with well-demarcated margins or as a region of decreased serosal detail due to hemorrhage. Large splenic masses arising from the splenic tail can result in dorsal jejunal displacement, whereas cranial gastric displacement and ventral jejunal displacement are observed with masses arising from the splenic head. The mobility of the splenic body and tail may influence the radiographic assessment of splenomegaly, and characterization is often improved with ultrasonography or CT.

Abdominal ultrasonography can provide valuable information in identifying the organ of origin, distribution pattern, presence of wide, tortuous vessels, and free abdominal fluid. Ultrasonography is unable to differentiate between benign and malignant masses due to similarities in morphology and variation within tumor types.[2] Imaging with CT provides information on tumor origin, vascularity, and feasibility of resection and yields higher diagnostic value for detection of distant metastases. Mineral opacity attenuation within the mass, as seen in the dog of the present report, also heightens the suggestion of malignancy, and mineral opacity attenuation has been a described feature in other malignant tumor types.[3] Additionally, the substantially lower postcontrast attenuation values of malignant versus nonmalignant focal splenic masses could potentially differentiate these lesions; however, discrepancies exist regarding this feature.[2] For the dog of the present report, the mass was found on physical examination, and radiography helped confirm abdominal pathology. Findings on CT excluded structural abnormalities that would have suggested invasion of surrounding structures and intra-abdominal or pulmonary metastasis.

Results of histologic examination of the mass from the dog of the present report were consistent with a pleomorphic stromal cell sarcoma with histologic characteristics of 2 distinctly different neoplasms. Peripheral nerve sheath tumors and osteo-

sarcomas are rare in the spleen; thus, the occurrence of a mass resembling both of these tumor types was unusual.[1,4] A single case report[4] of a primary splenic peripheral nerve sheath tumor in a dog describes infiltrative behavior to the surrounding mesentery, stomach, and pancreas. The mass in the dog of the present report did not display such locally invasive characteristics despite the mass abutting the surrounding tissue. Both peripheral nerve sheath tumors and extraskeletal osteosarcoma are aggressive and have a high rate of metastasis. Thus, the anticipated prognosis associated with a pleomorphic mesenchymal tumor of 2 such highly malignant neoplasms is poor. Few reports of splenic stromal cell sarcomas exist; however, described survival times following splenectomy range from 16 to 650 days.[5] The dog of the present report had a postsurgical survival time of 2 months. Splenectomy is the primary treatment for benign and malignant splenic masses; however, surgery may not be pursued by owners if evidence of metastasis is documented on diagnostic imaging. For the dog of the present report, diagnostic imaging was pivotal in identifying the association between the spleen and the mass, excluding gross metastasis, and selecting the appropriate treatment.

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