

Large idiopathic splenic haematoma in a dog – a case report

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Summary

The 10-year-old dog of the Cane Corso Italiano breed was referred for clinical examination due to abdominal distension, weakness, and pale mucous membranes. Laboratory blood tests revealed regenerative anemia. Abdominal ultrasonography identified a large heterogeneous lesion occupying a large part of the abdominal cavity, which exerted a mass effect. The owner consented to contrast-enhanced computed tomography (CT) examination of the abdomen and thorax. CT scan revealed a heterogeneous, hypodense, well-demarcated mass containing multiple fluid spaces. It was revealed that the mass originated from the spleen and showed no tumor metastases. Based on clinical and imaging examination, a decision was made to perform a midline laparotomy with splenectomy. After splenectomy the spleen, along with a spherical mass was submitted for histopathological examination. No presence of neoplastic cells was noted in any of the samples assessed, which provided the basis for a definitive diagnosis of splenic haematoma (*haematoma lienis*).

Keywords: spleen, splenic haematoma, splenectomy, computed tomography, diagnostic imaging

Splenic lesions are frequently diagnosed in dogs. The differential diagnosis includes neoplasms such as lymphomas, angiomas, haemangiosarcomas, sarcomas of the splenic stromal tissue, histiocytic sarcomas or metastatic disease and non-neoplastic lesions, for example, nodular hyperplasia, haematomas, abscesses, inflammation, infarction and splenic torsion (5, 9, 18, 22, 23, 26, 27).

Lesions occurring in the spleen present with no clinical signs, or the signs are non-specific. Depending on the type and severity of the lesions, clinical signs include apathy, anorexia, paleness of mucous membranes, prolonged capillary return time (CRT), and abdominal distension (9, 10, 13, 15, 21, 26, 30).

In the case of lesions occurring in the spleen, regenerative anaemia, thrombocytopenia, and, less frequently, neutrophilia are often observed in the complete blood count (CBC) (9, 10, 13, 15, 21, 26).

An abdominal ultrasound is the primary imaging examination that assists in assessing the spleen (2,

9, 13, 30). Depending on the type of lesion and the severity of the disease, ultrasound may reveal splenomegaly or focal changes in the echogenicity of the organ, which are often poorly defined and may be either non-echogenic or hypoechogenic. In the case of metastases, the lesions can be focal or multifocal, with different echogenicity (2, 20, 30).

Splenic haematoma is the most common non-neoplastic lesion detected in the spleen (1). It is a subcapsular accumulation of blood, which is macroscopically indistinguishable from other splenic hyperplasias, e.g., haemangiosarcoma (6, 18, 25).

Exploratory laparotomy, biopsy and a histopathological examination are the medical procedures most commonly used to make a definitive diagnosis (2, 5, 6, 9, 11, 14, 15, 20).

In most cases, the treatment of choice for splenic lesions is splenectomy (1, 5, 6, 8, 9, 11, 14-16, 23, 24, 28).

Case report

An owner came to the clinic with his 10-year-old neutered female dog of the Cane Corso Italiano breed. The owner was concerned by the dog's abdominal distension and weakness. The symptoms had been present for about a week. The dog had suffered no injury, and the possibility of poisoning was also ruled out.

The dog was fed with complete commercial food and provided with constant access to water, protected against ectoparasites, regularly dewormed, and received vaccinations against rabies and other infectious diseases. Two years earlier, the dog had a lipoma surgically removed from the shoulder region.

Body temperature, heart rate and respiratory rate were within the physiological limits for the dog. Meanwhile, paleness of the mucous membranes was noted.

Examination by palpation revealed a distension and soreness of the abdomen.

Laboratory blood tests carried out at the clinic showed regenerative anaemia: RBC (Red Blood Cells): $3.50 \times 10^{12}/L$, HCT (Hematocrit): 0.226 L/L, HGB (Hemo-

globin): 79 g/L, Reticulocytes: 319.9 K/ μ L. No abnormalities were found in the biochemical and coagulation blood tests.

For further diagnosis, the dog was referred for an abdominal ultrasound examination.

Ultrasound examination. Abdominal ultrasonography using a 5.0 MHz-convex transducer revealed a lesion occupying a large part of the abdominal cavity, which exerted a mass effect. The mass had a thick capsule, was well-demarcated, showed no vascularisation on Doppler examination, and contained multiple septa filled with non-echogenic fluid (Fig. 1). There was no fluid in the peritoneal cavity.

Because of the size of the mass, its origin could not be determined from the ultrasound examination.

Due to a suspected malignant process, the owner consented to a thoracic and abdominal contrast-enhanced CT examination, to determine the origin of the mass, rule out possible neoplastic metastases, and plan surgical management.

CT examination. Before the examination, the animal was administered medetomidine (Narcostart 1 mg/mL, Livisto, Poland) at a dose of 10 μ g/kg BW, i.v., and butorphanol (Morphasol 4 mg/mL, Livisto, Poland) at a dose of 0.1 mg/kg BW, i.v., and then put under general anesthesia using propofol (Plofed 1%, Polfa Warszawa) at a dose of 3.0 mg/kg BW, i.v.

The examination was carried out using a Philips MX 16-slice CT scanner. Images were acquired using a soft algorithm in the soft tissue window. The algorithm included non-enhanced and contrast-enhanced phases, with intravenous injection of iohexol at a dose of 2 mL/kg BW (Omnipaque 300 mg/mL, GE Healthcare AS, Oslo, Norway). The image acquisition parameters were 120 kV, 200 mAs/slice, pitch 1.0069, slice thickness 1.0, slice increment 0.5 mm, collimation 16×0.75 , and rotation time 0.75 s. The images were sent to the Philips IntelliSpace Portal.

CT scan in the pre-contrast phase revealed a heterogeneous, hypodense, well-demarcated mass with the following dimensions: length of 36.7 cm, width of 23.5 cm, and height of 16.7 cm. The mass extended from the bladder to the liver. It caused a mass effect, pushing the duodenum and small bowel loops dorsally and to the left, the colon dorsally, and the urinary bladder abdominally and caudally.

After intravenous administration of the contrast agent (in arterial phase I and venous phase II), the mass did not undergo post-contrast enhancement (Fig. 2). It was revealed that the mass contained multiple fluid spaces and originated from the spleen (Fig. 3). No enlarged lymph nodes were visualized in the abdominal region.



Fig. 1. Abdominal ultrasound examination. A lesion was visualized, featuring multiple partitions filled with non-echogenic fluid

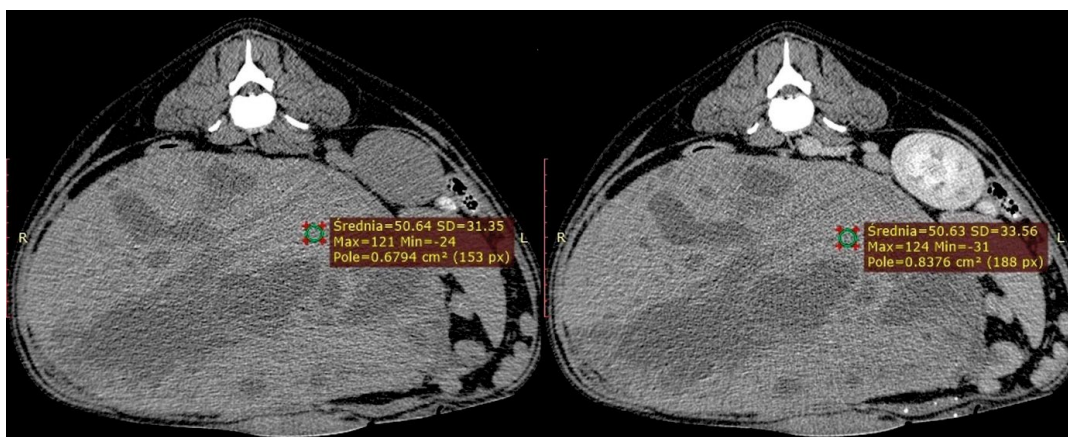


Fig. 2. Pre-contrast (left) and post-contrast (right) CT images demonstrating no enhancement of the lesion after contrast administration. Attenuation measurements obtained from the same region of interest (ROI) remained unchanged in both phases, measuring 50.6 Hounsfield units (HU)



Fig. 3. Computed tomographic examination, soft tissue algorithm in unenhanced phases. A hypodense, well-demarcated mass containing multiple fluid spaces. The mass exerts a mass effect and occupies a significant part of the abdominal cavity. The splenic origin of the mass is demonstrated

CT scan of the chest showed no tumor metastases to the lung tissue nor enlarged lymph nodes. No other pathology was found.

Based on the physical examination, ultrasound and CT scan, a decision was made to perform a midline laparotomy with splenectomy. By signing the relevant documents, the dog's owner consented to the surgical removal of the spleen along with the tumor.

Surgery description. Because pre-surgical examinations showed severe anaemia, a decision was made to perform a blood transfusion on the animal. As the dog had not had a previous blood transfusion procedure, it was decided to transfuse the blood without first performing a crossmatching (12). One unit of blood was prepared and administered to the dog. The blood parameters were re-determined to reveal a significant improvement: RBC: $5.12 \times 10^{12}/L$, HCT: 0.280 L/L, HGB: 95 g/L.

Medetomidine hydrochloride (Domitor, Orion Corp., Finland, 0.1 mg/kg BW, i.m.) and methadone (Comfortan, Eurovet Anim. Health BV, the Netherlands, 0.3 mg/kg, i.m.) were used for premedication. An intravenous line was established, followed by induction of general anesthesia by intravenous administration of ketamine (Vetaketam, VetAgro, Poland, 2 mg/kg, i.v.) with relanium (Ziapam, VetAgro, Poland, 0.3 mg/kg, i.v.). For deeper induction and intubation of the patient, propofol (Propomitor, Orion Corp., Finland, 2 mg/kg BW, i.v.) was used, and the patient was intubated with a 9.0 mm cuffed endotracheal tube. During and after the procedure, the dog was administered a continuous intravenous infusion of crystalloid solutions (Plasmalyte, Baster, Poland, 5 mL/kg/h, i.v.). General anesthesia was maintained with inhaled isoflurane (Vetflurane, Virbac, Great Britain, at a concentration of 1.5%) alongside oxygen therapy. During and after the procedure, the animal's vital signs were monitored (pulse, heart rate, blood oxygenation, and non-invasive capnography) using a cardiac monitor (uBox, VS2000, Utech Co., China).

The incision was made adequately to the tumor dimensions in the midline, from the sternal xiphoid process to the pelvic symphysis. The opening of the abdominal cavity revealed a large lesion adhered to the omentum and exerting pressure on the surrounding organs. Once an approach was obtained, blunt dissection of the lesion was undertaken. The vessels were ligated twice with a size 2-0 PGA absorbable thread (Yavo, Poland) in the vicinity of the splenic hilum. Following removal of the lesion, visual inspection of the abdominal cavity revealed no masses or tumors in the surrounding tissues. The abdominal cavity contained a small amount of bloody fluid, which was removed with an automatic suction pump. The abdominal cavity was closed with three suture layers. The first level involved aponeurosis of the abdominal rectus muscle.

A simple interrupted suture was made with a size 0 PGA absorbable material (Yavo, Poland). The second level was closed with a simple continuous spiral suture using a size 2-0 PGA absorbable material. For skin closure with interrupted figure-of-8 suture, non-absorbable 2-0 nylon material (Yavo, Poland) was used. The procedure was completed without complications, and the animal, after awakening, was left at the clinic for observation and released to its owner the following day in good general condition.

After the procedure, the dog was administered the antibiotic cefalexin (Ceporex, Intervet International B.V., the Netherlands, 10 mg/kg BW, SC) and meloxicam (Loxicom 5 mg/mL, Norbrook Laboratories Limited, Great Britain, 0.2 mg/kg BW, SC). For daily administration by the owner at home, meloxicam (Loxicom 1.5 mg/mL, Norbrook Laboratories Limited, Great Britain, 0.1 mg/kg BW, SID, orally) for 5 days, and an antibiotic cefalexin (Kefavet, Orion Corp. Finland, 15 mg/kg BID, orally) for the continuation of antibiotic therapy for 10 days were dispensed.

Histopathological examination. The spleen, along with a spherical mass measuring approximately 43 cm × 27 cm × 23 cm, weighing 12 kg, was submitted for histopathological examination (Fig. 4). A total of 20 specimens were collected from different mass areas, its border with the splenic parenchyma, and the spleen itself, which were then fixated in 10% buffered formalin, pH = 7.2 and transferred to paraffin blocks. The prepared microscopic slices were stained with haematoxylin and eosin and assessed by light microscopy. The microscopic examination revealed variably sized areas of acute hemorrhage and old blood extravasations (clotted blood) mixed with fibrin deposition and areas of necrosis, which were separated by thin bands of connective tissue (Fig. 5a). In the peripheral zone of the mass, the extravasated blood caused the detachment of the splenic capsule from the deeper-located splenic parenchyma. In the central part, extensive areas of necrosis were predominantly observed. In addition, in various areas of the mass, clusters of hemosiderin-laden macrophages result-



Fig. 4. The spleen removed during surgery, along with the mass (splenic haematoma). Diffuse adhesion to the omentum is visible

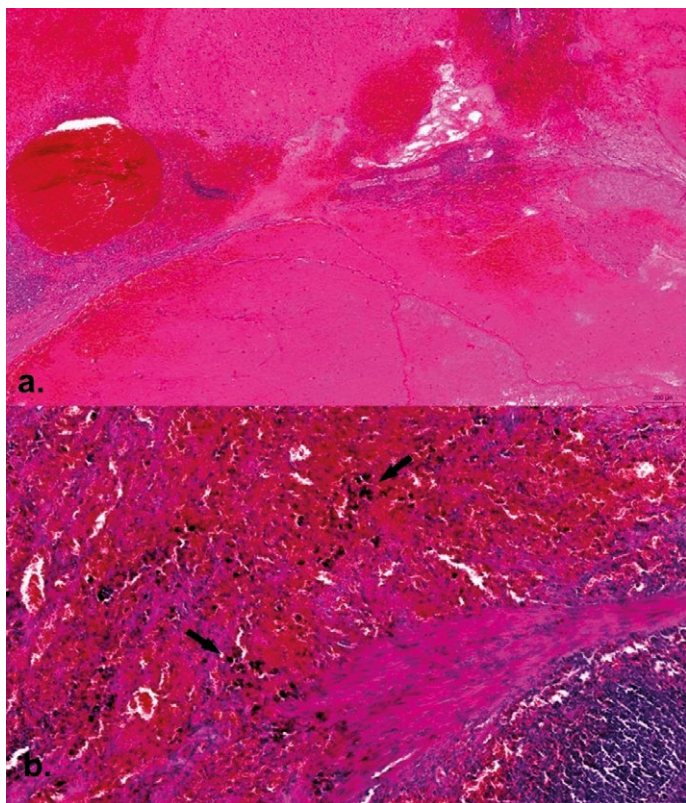


Fig. 5 a) Extensive areas of extravasated blood in the vicinity of fibrin deposits and areas of necrosis. HE Stain. Magnification of 5 ×. **b)** The border of splenic parenchyma and blood extravasation. In the vicinity of the erythrocytes undergoing haemolysis, there are clusters of macrophages laden with haemosiderin granules (←). HE stain. Magnification of 50 ×

ing from erythrocyte haemolysis, as well as proliferating reactive fibroblasts, were observed (Fig. 5b). No presence of neoplastic cells was noted in any of the slices assessed, which provided the basis for a definitive diagnosis of splenic haematoma (*haematoma lienis*).

Discussion

Splenic haematoma is characterized by subcapsular or parenchymal accumulation of blood (1, 6, 24). This makes the clinical, ultrasound and radiological pictures difficult to distinguish from neoplastic lesions, such as hemangiosarcoma, as in both cases there may be a large amount of haemorrhage and necrosis within the lesion (7).

There are a number of possible causes of splenic haematoma in dogs, including mechanical splenic injury, blood clotting disorders, or bleeding from splenic tumors. In older dogs, splenic haematomas are likely to develop spontaneously with no obvious cause (3).

In dogs, benign tumorous lesions of the spleen occur statistically as often as malignant lesions (17). Benign lesions, such as cysts or abscesses, occur infrequently, but if their picture is more complex, they cannot be distinguished, based on ultrasound imaging, from haematomas or nodules with foci of disintegration (9, 19, 20).

It was also demonstrated that color-coded and power Doppler examinations fail to distinguish between malignant and benign processes occurring in the spleen (19, 20).

On CT, the splenic parenchyma should be assessed in the portal vein phase, as heterogeneous splenic enhancement in the arterial phase may resemble splenic injury or contusion (4, 29).

On CT scans, splenic haematomas are usually visible as complex, heterogeneous masses containing low-density fluid, accentuating the organ capsule. These haematomas are often difficult to distinguish from splenic neoplasms, as their imaging may reveal similar characteristics (29). After intravenous contrast medium administration there are visible as nonenhancing masses (7).

Fine-needle aspiration and tissue core biopsies may produce erroneous results due to bleeding concomitant with splenic neoplasm (2, 11, 14, 15, 29).

Due to the lack of specific clinical signs in the initial phase of the disease, the diagnosis of splenic lesions can be challenging. Due to late diagnosis, they can often reach large sizes, and the capsule can be ruptured, resulting in splenic rupture. Massive haemorrhage leads to hypovolemic shock, which is followed by the sudden death of the animal. Although a rupture of a splenic tumorous lesion with subsequent accumulation of blood in the peritoneal cavity is most commonly seen in malignant splenic lesions, it also occurs in benign lesions (11, 13, 21, 28).

In this case report, a 10-year-old female dog of the Cane Corso Italiano breed was diagnosed with an extensive splenic haematoma, which, at the initial stage of diagnosis, posed a serious differential challenge with a neoplastic process of the organ.

Surgical removal of the spleen together with the tumor lesion, followed by a histopathological examination excluding the presence of neoplastic cells, gave rise to a definitive diagnosis of splenic haematoma (*haematoma lienis*), which had a favorable effect on the patient's prognosis.

The owner and his dog attended a follow-up visit twelve months after the surgery. The results of the clinical examination and follow-up blood tests (CBC and blood chemistry) were within physiological limits, and the abdominal ultrasound and thorax radiography showed no pathological lesions.

Idiopathic splenic hematomas are uncommon, and they can be difficult to diagnose if there is no history of trauma or systemic disease. Laparotomy and splenectomy are the most effective diagnostic and therapeutic method when a comprehensive history and physical examination, diagnostic imaging, and laboratory work-up are inconclusive.

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