

Splenis: the autotransplantation of splenic tissue in dog

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Abstract— Splenis is a medical condition in which splenic tissue is found in the peritoneal cavity or in other unusual locations. Their development occurs after splenic tissue spillage induced by spleen trauma or surgery, mainly splenectomy. The implants are benign and asymptomatic in most of case, and it is an incidental finding at abdominal surgery or autopsy. Albeit benign, it is often misdiagnosed as a tumour. The splenis should be considered in the differential diagnosis in all patient presenting nodules and a previous history of splenic injury. These heterotopic tissues preserve the spleen function so don't need to be removed, exception in symptomatic cases. Recognition is important to avoid unnecessary diagnostic and surgery procedures. This study describes the splenis identification on omentum, in asymptomatic dog during elective ovary-hysterectomy.

Keywords— canine, ectopic spleen, splenic heterotopia, omental mass

INTRODUCTION

Splenic trauma and rupture can lead to a dissemination and an auto transplantation of splenic tissue, this fact is denominated splenis.[1] The most patients with splenic heterotopia are asymptomatic and usually is an incidental identification in surgical procedures or by imaging exam performed for other clinical.[2]

Heterotopic (or ectopic) splenic tissue can be classified as splenis or accessory spleen.[3] Splenis is thought to result from spilled splenic tissue that receive blood supply from surrounding vessels and it is different of accessory spleen that results from an incomplete fusion of mesenchymal buds during embryogenesis and their blood supply derives from the splenic artery.[4] There is estimated that accessory spleen to occur in 10%-30% of the general population. Otherwise, splenis may be identified in about 25% of patients undergoing splenectomy for trauma.[5]

Usually, splenis nodules are small, less than 3 cm for the majority but in humans was described nodules of 5 cm in abdomen [6] or a 12 × 10 cm right pelvic mass compressing the right seminal vesicle and deviating the rectum [4]. A research using computer

tomography (CT) in humans identified splenis mostly in the abdominal or pelvic cavity, as greater omentum, small-bowel serosa, parietal peritoneum and undersurface of the diaphragm. Unusual and rare locations as the liver, frequently subcapsular location and thought to occur via invagination of splenic implants or via splenic vein emboli into the liver; kidney, mimicking renal cancer when found near or adherent to the surface and thorax, usually occurs as a result of simultaneous diaphragmatic and splenic rupture.[7]

There are few reports about ectopic splenic tissue in dogs. Patnaik et al. [8] have detected multiples nodules of various sizes seen in the liver, mesentery, diaphragm and peritoneal wall, identified 4 years after splenectomy. Knostman et al. [9] have related a single case of intrahepatic splenis in a poodle with history of traumatic splenic rupture and splenectomy 5 years previous, suggesting that the implantation occurred by the migration of splenic cells through the splenic to gastrosplenic veins and into the portal vein. Ramirez et al. [3] confirmed four cases of intrapancreatic accessory spleens in two dogs and two cats, over a research period of 16 years. Presentations as a large abdominal mass in dog that previously had a splenectomy 2 years before [10] and four mid-ventral mesenteric abdominal masses [11] or multiples focus implants can be also seen on the right side of the peritoneal wall and over the diaphragm,[8] both 4 years after splenectomy, and on omentum and uterine ligaments perceived during nephrectomy surgery.[12]

Although does not show many clinical symptoms, clinical complaints can occur due the size or location, as a pain caused by infarction, intestinal obstruction gastrointestinal haemorrhage or hydronephrosis caused by the ureter compressing.[13]

In despite of benign condition, often resembles a neoplasm or metastatic disease and the lesions are recognized as neoplasms, it is necessary to make differential diagnoses with haemangiomas, endometriosis and metastatic cancer.[14] In human medicine there are many reports of splenis mimicking neoplasia as mesenteric metastases in a woman with breast carcinoma,[15] a renal cancer in splenorenal fusion,[13] abdominal a multinodular mass.[16]

Thus, for conclusive diagnostic is purposes a biopsy and histopathologic evaluation. An accessory spleen is functionally and histologically similar to

normal splenic tissue, mainly red pulp, whereas splenosis tissue is not observed splenic characteristics, such as a thick capsule, smooth muscle elements, and a blood supply from the splenic artery.[2, 16]

Individuals splenectomised for trauma have lower infection rates than those splenectomised for other conditions and suggest that residual functional splenic tissue after splenectomy may provide ongoing immunological protection.[17] When splenectomy is unavoidable, splenic auto-implants represent a suitable option to preserve splenic function. This operation is based on splenosis and experimental studies have indicated the greater omentum to implant splenic fragments.[18]

Already in 1971, Widmann & Laubscher [19] in their article "Splenosis. A Disease or a Beneficial Condition?" warned of beneficial effects, including avoidance of the asplenic state with preservation of a normal blood smear and response to infection, in human cases of splenectomy for trauma with and without residual splenic tissue.

Although there are different descriptions in human medicine, in veterinary medicine there are few reports in companion animal literature.[10] This study describes the splenosis identification on omentum, in asymptomatic dog during elective ovary-hysterectomy.

MATERIALS AND METHODS

A stray intact female dog, approximately 4 years of age, to referred to elective ovary-hysterectomy (OH) procedure. Recently capture on the street, there was no medical history information about the patient. Despite this life condition, it presented a normal body condition and was not observed any alteration in the physical exam, so was then referred for OH surgery. The anaesthesia procedure was performed with ketamine (10 mg/kg), midazolam (0.5 mg/kg) and acepromazine (0,04 mg/kg). During the surgical procedure, multiple rounded structures were observed, with circumferences ranging from 0.2 - 0.5 cm, dark red, speckled on the omentum (Figure 1). OH was performed without complications and despite the absence of macroscopic alterations in the spleen inspection, it was opted for the omentum maintenance in the face of suspicion of splenosis. For conclusive diagnosis was collected 3 different samples from the structures, fixing in 10% buffered formol, processed in paraffin and stained with hematoxylin-eosin (HE).

RESULTS

An ultrasound evaluation was performed, 48 hours after the surgical procedure, without identifying significant changes, including with regard to splenic aspect and the principal spleen was not smaller, scarred or distorted in shape. In histopathological analysis, the structures were characterized by tissue organized by red pulp mixed with foci of follicular lymphoid proliferation, with trabeculation and capsule formation externally, similar to splenic tissue. The patient recovered properly and was not observed alterations during 6 months of clinical follow up.

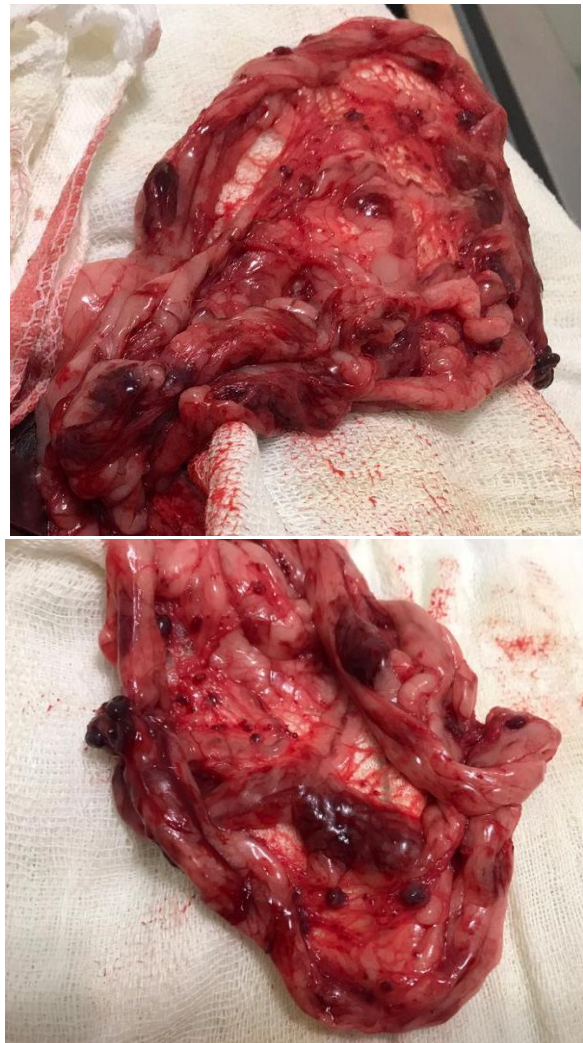


Figure 1. Multiple rounded structures were observed, with circumferences ranging from 0.2 - 0.5 cm, dark red, speckled on the omentum

DISCUSSION

Ectopic spleen is a clinical condition rarely reported in companion animal literature¹⁰ and this study describes remnants of splenic tissue, as multiples foci above omentum in asymptomatic dog with splenosis, identified during neutered surgery, according with observed in human medicine, who's the most patients usually is an incidental found in surgical procedures.²

The history of animal and, the lesions location and characteristic facilitated the splenosis suspicion during surgical procedure. Occurrences in abdominal or pelvic cavities is most often observed in humans, up to 65% of splenic rupture cases identified⁷ the great omentum has a circulation that supports the implantation, reason for indication to splenic implant.¹⁸

Multiples and small nodules with splenic tissue spillage is a usual aspect of splenosis and differ from accessory spleens that is limited to one or two, mainly located in the left upper abdominal quadrant and its presence in greater omentum is a rare condition.²⁰

Regardless of origin is accessory spleen or splenosis, ectopic splenic tissue has been reported to undergo hypertrophy secondary to splenectomy¹⁰, differing of this case whose patient was no splenectomized and without spleen alterations in ultrasound exam at the diagnostic moment. Maués et al.¹² also observed an unexpected splenosis in omentum and uterus during nephrectomy in dog presenting spleen although it was deformed and scarred on the splenic tail.

The splenosis should be considered in the differential diagnosis in all patient presenting nodules and a previous history of splenic injury.²¹ In splenic trauma or surgery histories, splenosis is a possibility in abdominal or pelvic cavity, thorax, subcutaneous tissues, and other less common locations.^{4,7}

Albeit benign, it is often misdiagnosed as a tumour, like as haemangiomas and metastatic cancer thus an accurate diagnosis can be difficult.^{4,14} Zhang et al.² warned that an enlargement of ectopic spleen can be caused by leukemic infiltrate, in patients with diagnosis of acute myeloid leukemia and a remote history of splenic rupture/splenectomy.

Radiologists can help suggesting or establishing a splenosis diagnosis, particularly in less typical cases, to avert unnecessary tissue sampling.⁷ Recognition of this entity is important to avoid unnecessary diagnostic and surgery procedures, ¹³ once the surgery is not indicated in asymptomatic patients.⁴

These heterotopic tissues function is like a spleen in splenectomized patients so there is no necessity to be removed¹⁴ and has been suggested that the presence of residual splenic tissue may provide immunological protection.¹⁷

Excluding necropsy situations, often splenosis is found incidentally during investigation or surgery for another clinical suspicion. Recognizing this condition is essential to decide the better procedure in each situation, mainly differentiating from neoplasms. An even invasive clinical approach should be preferred, since splenosis nodules are benign and functionally active.

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