



PATIENT PRESENTING CLINICAL SIGNS

George Ernest

Presented to clinic for ADR. Patient had presented to rDVM for lethargy and decreased appetite - temperature was 105F. Decreased appetite since Wednesday but stopped eating on own over weekend. Lethargic and not as active as normal.

SPECIES

Canine

BREED

Pit Bull

SEX

Neutered Male

AGE

7 Years

WEIGHT

39 kg

INTERPRETED BY

Eric Lindquist, DMV

DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Dr. Schwanebeck

HOSPITAL NAME

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Hospital Deland

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Abnormal PE/Chem/CBC/UA Results: PE: +/- Grade II/VI left heart murmur Temperature on presentation: 106.1 Chem: Minimal hypocalcemia, mild hyperglobulinemia, increased amylase (>2500) and lipase (>1000). CBC: Mild neutrophilia 4DX: Negative Radiographs: Findings 2 view abdominal radiographs and a right lateral radiograph of the thorax (4 images) dated July 18, 2023 are available for interpretation. There are no prior studies available for comparison. Radiographic findings: THORAX: The cardiac silhouette is normal in size and shape. The pulmonary vessels are normal in size and taper appropriately. There is an ovoid shaped soft tissue opacity superimposed over the region of the sternal lymph nodes. The cranial mediastinum is otherwise unremarkable. The pulmonary parenchyma is normal. No soft tissue pulmonary nodules or masses are identified. There is no evidence of pleural effusion or thoracic lymph node enlargement. The musculoskeletal structures are normal. ABDOMEN: Abdominal serosal detail is normal. Amount of heterogeneous soft tissue opaque material and small volume of gas. The small bowel is diffusely gas-filled without evidence of pathologic dilation. The colon contains a small amount of poorly formed fecal material. The liver, spleen, kidneys, bladder are normal. There is multifocal ventral spondylosis deformans of the lumbar vertebral column. Conclusion 1. The material within the colon is suggestive of diarrhea. However, this is best determined by the patient's current clinical signs. If diarrhea is present or develops, enteritis (dietary indiscretion, infectious, inflammatory, or toxin) are possible. 2. Small amount of amorphous soft tissue opaque gastric material. Differentials include ingesta or foreign material. 3. Diffuse gas filling the small bowel. Differentials include functional ileus or enteritis. There is no evidence of mechanical obstruction of the small bowel. 4. Ovoid shaped soft tissue opacity superimposed over the region of the sternal lymph nodes. Differentials include mild sternal lymphadenomegaly or superimposition of a subcutaneous or cutaneous structure associated with one of the proximal thoracic limbs. Correlate to physical examination Recommendations A definitive cause for the patient's described fever is not identified. Left lateral and VD radiographs of the thorax may be considered to complete the study. An abdominal ultrasound could also be considered for further evaluation.

ULTRASONOGRAPHIC EXAMINATION OF THE ABDOMEN

Urinary System

The **urinary bladder**, trigone, and pelvic urethra presented normal thicknesses and normal tone. The ureters were not visible which is normal. No uroliths or sediment were visualized and anechoic urine was present. No evidence of inflammatory or neoplastic changes were noted. Ureteral papillae were normal.

Iliac lymph nodes were mildly enlarged and hypochoic with reactive surrounding mesentery. The largest lymph node measured 3.0 cm x 1.0 cm.

The **kidneys** revealed normal size and structure, corticomedullary definition and ratio for this age. The cortices presented largely uniform texture with normal echogenic relationship to liver and spleen. Medullary structure differed distinctly from the cortex and no evidence of pelvic dilation was present. The capsules were acceptably uniform without significant irregularities. The left kidney measured 7.8 cm. The right kidney measured 7.8 cm.



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Adrenal Glands

The **right adrenal gland** was visualized and recognized as having normal shape, size, position and echogenicity for this breed. The phrenic vasculature, glandular echogenicity and detail were unremarkable. Capsule, cortex, and medullary definition were normal for this age patient. The right adrenal gland measured 0.85 cm at the cranial pole and 0.55 cm at the caudal pole.

The region of the **left adrenal gland** was imaged, no evident pathology.

Spleen

The **spleen** presented somewhat scalloping contour and subtle heterogeneous parenchymal changes. FNA with cytology and culture indicated to assess for splenitis with a minor potential for round cell neoplasia.

Liver

The **liver** images submitted revealed subjectively normal liver size, contour, and structure. Parenchymal echogenicity was naturally coarse and hypoechoic to the spleen. Vascular and biliary tracts were of normal volume with no evidence of congestion. The gallbladder presented acceptably thin walls with primarily anechoic content. The cystic and common bile ducts were normal. No pathological hepatic lymphadenopathy was evident. No overt structural evidence of inflammatory, infiltrative or regenerative pathology was evident.

Gastrointestinal

Examination of the **gastrointestinal tract** revealed an unremarkable stomach and small intestine regarding structure. There were minor areas of luminal fluid noted. There was no evidence of obstructive pattern. Curvilinear patterns were retained throughout the gastrointestinal tract. Areas of hyperperistalsis were noted. This is consistent with response to irritation. The colon was unremarkable.

Pancreas

The right limb of the **pancreas** was mildly heterogeneous and hypoechoic with enhanced surrounding mesentery, suggestive for low-grade pancreatitis. Reactive mesentery noted in the cranial abdomen, associated with the pancreas.

ULTRASONOGRAPHIC FINDINGS

- Iliac lymphadenopathy
- Prominent spleen with micronodular changes
- Gastroenteritis/pancreatitis pattern

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

I'm concerned for potential emerging neoplasia in the spleen and iliac lymph nodes. FNA of both structures with cytology and culture indicated, particularly culture of spleen. Treatment for pancreatitis/gastroenteritis warranted in the meantime.



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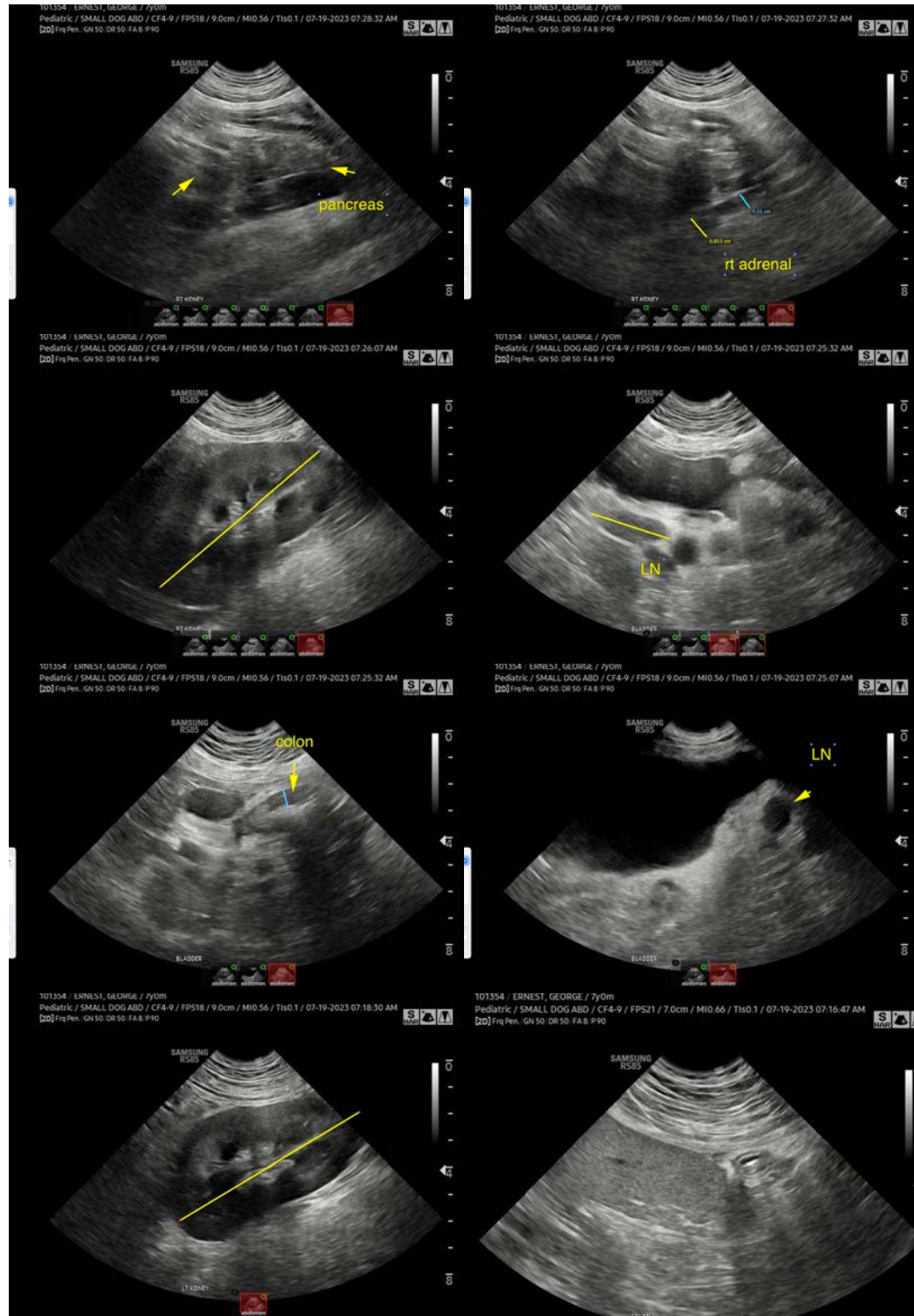
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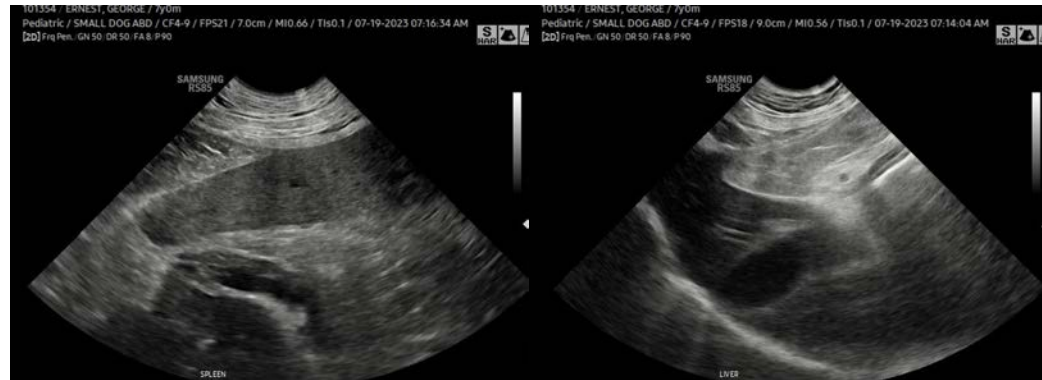
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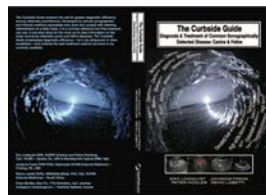


The information and recommendations provided are based on the images presented by the referring veterinarian/sonographer. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

Thank you for this referral. If the clinical or image interpretation does not parallel your findings or if I can be of any further assistance please contact me.

Eric Lindquist, DMV, DABVP, Cert. IVUSS, CEO of SonoPath.com

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The following is an applicable excerpt from the *Curbside Guide to Diagnosis & Treatment of Sonographic Disease* offered by SonoPath.com Lindquist, Frank, Lobetti, and Modler.

An essential quick guide for every general practitioner and sonographer.

<https://sonopath.com/products/curbside-guide-editing-due-release-12012015>

Fever of Unknown Origin

<http://www.sonopath.com/FUO>



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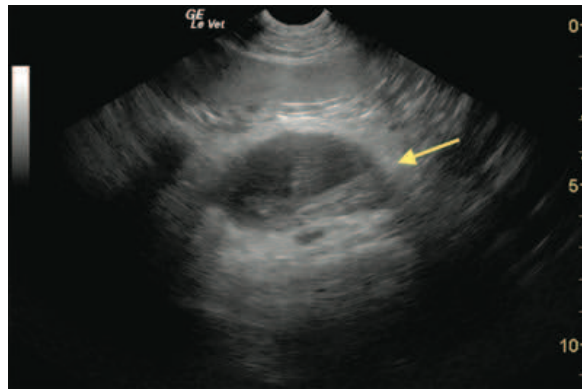
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Long axis of the mid-abdomen in a dog with an omental abscess after foreign body penetration from the gastrointestinal tract. The hypoechoic necrotic center of the lesion is surrounded by a thick echogenic capsule and hyperechoic mesenteric fat (arrow) indicating focal peritonitis. The linear echogenic needle (5 cm depth) is barely visible owing to the density of the purulent material contained within the abscess.

Description: The definition of a fever of unknown origin (FUO) has not been clearly defined for animals. Currently, it is either understood to be a fever that does not resolve within the period one would expect for a “self-limiting infection” being treated with appropriate antimicrobial therapy, or that for which an underlying diagnosis has not been determined despite considerable diagnostic effort. The common causes of FUO were summarized concisely in a presentation at the American College of Veterinary Internal Medicine 2004 Forum. The presenters synthesized information from three veterinary papers on the subject, which suggested the following:

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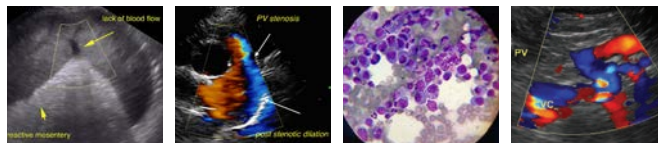
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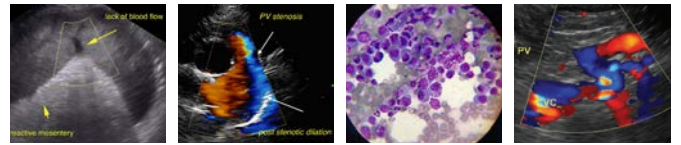
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Final Diagnosis	Bennett (dogs & cats)	Dunn and Dunn (dogs only)	Lunn (dogs & one cat)	Total	Percent
Infection	21	16	10	47	28
Immune	18	22	6	46	27
Bone marrow disease	4	22	2	28	16
Neoplasia (outside marrow)	0	10	2	12	7
Miscellaneous	2	12	2	16	9
No diagnosis	0	19	2	21	12
TOTALS	45	101	24	170	99

The types of infection diagnosed in this case series were varied, ranging from discospondylitis (8 cases), blastomycosis (6), and bacterial endocarditis (4), to leishmaniasis (1), prostatitis (1), and *Ehrlichia canis* infection (1); a multitude of other infectious causes also fell within the spectrum. Of the cases in which immune-mediated disease was found, 44% had immune-mediated polyarthritis. Bone marrow diseases



PATIENT	included myeloproliferative disease, myelodysplasia (8), lymphocytic leukemia (8), myeloma (3), chronic granulocytic leukemia (3), lymphoblastic leukemia, and malignant histiocytosis. The types of neoplasia located outside the bone marrow included lymphoma (6), metastatic disease (2), and neoplasms of the lung, spleen, and stomach. Finally, miscellaneous diseases included hypertrophic osteodystrophy (6), meningitis (3), portosystemic shunt (3), lymphadenitis (2), panosteitis, and intervertebral disc disease. Overall, the most common causes across all cases were polyarthritis (44), lymphoid neoplasia (15), discospondylitis (8), myelodysplasia (8), hypertrophic osteodystrophy (6), and blastomycosis (6).
George Ernest	
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Canine	
BREED	<u>Clinical Signs:</u> Animals usually present with either persistent or waxing and waning fevers ranging from 103°F to 106°F. Other clinical signs depend on the underlying cause of the fever. Careful and thorough physical examination is required to assess potential causes.
Pit Bull	
SEX	<u>Diagnostics:</u> FUO etiologies are partly related to geography, and thus locale or travel history should factor into a practitioner's diagnostic approach. A patient's lifestyle may also provide clues regarding exposure to certain etiologic agents. Therefore, conducting a thorough history can unveil important pieces of the diagnostic puzzle. Physical examination is especially important and should include an inspection of all accessible lymph nodes, palpation and movement of the joints, a fundic examination, a neurological evaluation, spinal and limb palpation and range of motion tests, and a rectal examination.
Neutered Male	
AGE	
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WEIGHT	A minimum database should include a CBC reviewed by a clinical pathologist, as well as a biochemical profile and urinalysis. Retroviral testing should also be considered in cats. In areas where tick-borne disease is prevalent, in-house testing should be performed early. Advanced laboratory work can include: urine culture, blood culture, and infectious disease panels (PCR and/or serology). In dogs, one may screen for the following infectious agents: <i>Ehrlichia</i> spp., <i>Borrelia burgdorferi</i> , Rock Mountain Spotted Fever, <i>Bartonella</i> spp. (culture and PCR), and <i>Leptospira</i> spp. in cases of hepatic or renal involvement. In cats, one should evaluate for FeLV, FIV, feline infectious peritonitis (FIP) virus, toxoplasmosis, <i>Hemoplasma</i> spp. (<i>Mycoplasma</i>), and <i>Bartonella</i> spp. (culture and PCR). Testing for <i>Ehrlichia</i> spp., <i>Rickettsia</i> spp., and <i>Anaplasma phagocytophilum</i> can also be considered. A fungal assay is indicated if the patient lives in or has had exposure to a region with a higher incidence of fungal disease. Other infectious disease tests may be performed depending on the geographical location of the pet. Screening for <i>Brucella</i> should be done in breeding dogs. Immune-mediated disease screening can include a Coomb's test, a slide agglutination test (if the patient is anemic), and an antinuclear antibody (ANA) test. Immune disease is often a diagnosis of exclusion.
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HOSPITAL NAME	Imaging should include thoracic radiographs, abdominal ultrasound, and/or abdominal radiographs. Ultrasound can be very useful for assessing evidence of cholangiohepatitis, pyelonephritis, chronic urinary tract infection, abscess formation, peritonitis, and neoplasia; it also permits an examination of the intra-abdominal lymph nodes. An echocardiogram can offer assessment for vegetative endocarditis, whereas spinal radiographs offer assessment for discospondylitis. In cases where all other testing has proven negative and the patient has not responded to broad-spectrum antibiotics and supportive care, arthrocentesis should be considered to evaluate for septic joint disease, immune-mediated polyarthritis, and infectious disease. Finally, one can consider assessing the cerebrospinal fluid for meningoencephalitis, GME, and meningitis/arteritis. A bone marrow exam should be performed if blood dyscrasias are noted on the CBC.
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44099	<u>Treatment:</u> Treatment of the fever depends entirely on the underlying cause. Ideally, a thorough diagnostic plan will yield a diagnosis that will guide the appropriate therapeutic course. However, if an exhaustive approach has not produced a definitive diagnosis and there is no response to broad-spectrum antibiotics, trial therapy with immunosuppressive agents such as prednisolone can be considered to treat presumed immune-mediated diseases. Given the potential for negative sequelae should an underlying infection be present, one must be certain that the investigation is thorough and monitor the patient's response carefully.
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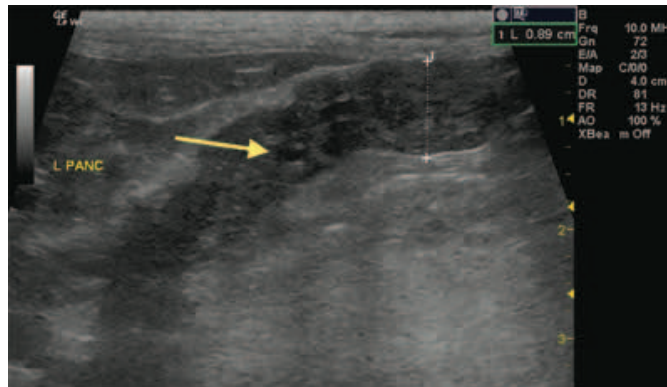
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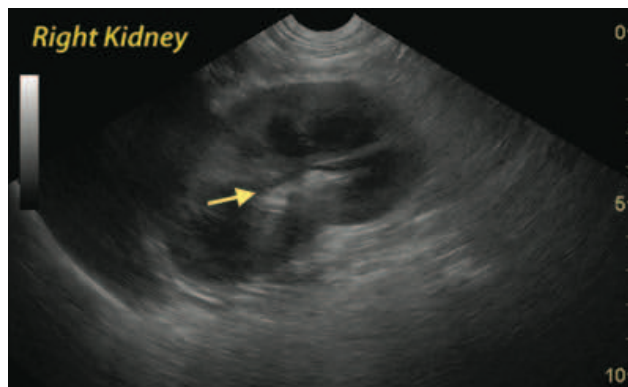
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Conclusion: If a documented fever has not responded to antibiotics, antipyretics, or general nursing care, it is important to obtain a diagnosis to guide more specific treatment. A systematic physical examination and thorough history-taking will help inform further diagnostics in addition to what is revealed by the minimum database.



Long axis of the left pancreatic limb (between calipers) in a cat with pancreatitis after undergoing a renal transplant. Note the decrease in echogenicity and mild loss of regular echotexture of the swollen and irregularly contoured pancreas. Also note the mild dilation of the pancreatic duct (arrow). Focal peritonitis is evident by increased echogenicity and loss of the linear echotexture of the surrounding mesentery.



Long axis of the right kidney in a dog with pyelonephritis. Note the increased echogenicity and irregular outline of the renal crest and diverticuli and the mild dilation of the renal pelvis (arrow).



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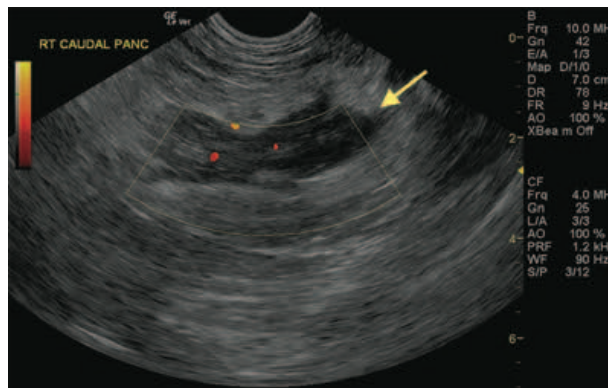
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Long axis of the right pancreatic limb in a dog with acute pancreatitis. The swollen hypoechoic pancreas is embedded in hyperechoic mesenteric fat (arrow). Note the regional differences in blood flow intensity within the parenchyma as demonstrated by Power Doppler interrogation compatible with multifocal disruption of vascularization as a sequela of the severe inflammation.

References:

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