Urosepsis in a Dog

Introduction

Urosepsis occurs when bacterial urogenital tract infection progresses to systemic sepsis. Sepsis is a clinical condition occurring when a suspected or confirmed septic nidus is identified and at least two of the criteria for systemic inflammatory response syndrome (SIRS) are satisfied. Criteria of systemic inflammatory response syndrome include increased or decreased body temperature, tachycardia, tachypnea, and leukocyte derangements[1]. A more recent definition of sepsis has been established in humans where sepsis is defined as "life-threatening organ dysfunction caused by a dysregulated host response to infection"[2]. With this definition, organ dysfunction is characterized by a numeric score for each of six organ systems (respiratory, cardiovascular, hepatic, hematologic, renal and neurological). The resulting number is the Sequential [sepsis-related] Organ Failure Assessment (SOFA) score. The SOFA scoring system was created to allow objective criteria for establishing prognosis for survival in septic patients[2]. Studies have shown that SOFA scoring is useful in establishing prognosis in critically ill human patients, however this system is not yet widely used in veterinary medicine.

Lower urinary tract infection, pyelonephritis, bacterial prostatitis, prostatic abscessation, pyometra, septic uroabdomen and infection secondary to urinary catheter placement are some of the more common causes of urosepsis[1]. Severe urosepsis may lead to hypoperfusion of various organ systems, resulting in multiple organ dysfunction syndrome (MODS), which is associated with increased risk of death[1].

Chronic kidney disease, endocrinopathies, urolithiasis, abnormal urogenital anatomy, immunosuppression, and urinary catheterization are predisposing factors for development of bacterial urinary tract infection and urosepsis[1,3,4].

Patients with urosepsis may present with a variety of clinical signs including pollakiuria, stranguria, polyuria, polydipsia, hematuria, abdominal or lumbar pain, lethargy, anorexia, weakness and collapse. Physical examination findings may include hyperthermia, injected mucous membranes, tachycardia, arrhythmias, tachypnea, abdominal pain, bounding or thready pulse quality, weakness, stupor, and collapse.

The identification of bacteria through aerobic bacterial culture of urine confirms urinary tract infection, though preliminary diagnosis may also be made with cytologic evaluation of urine if culture results will be delayed. Urinary tract fluid may be obtained via centesis of the affected organ. *Escherichia coli* is the most common pathogen identified in the urinary tract in dogs, with *Klebsiella pneumoniae* and *Staphylococcus pseudointermedius* also frequently identified[1,3,4].

Complete blood count may reveal leukocytosis, leukopenia, left shift, thrombocytopenia and coagulopathy. Chemistry profile changes depend on the degree of MODS and may include azotemia, hypoglycemia, hypoalbuminemia, hyperbilirubinemia, elevated alanine transaminase (ALT) and alkaline phosphatase (ALP).

Blood cultures should be considered and are recommended in immunocompromised patients[3]. Ideally, samples should be obtained prior to initiation of antimicrobial therapy.

Treatment/Management/Prognosis

The cornerstone of acute-phase therapy for urosepsis is intravenous (IV) antimicrobial therapy and IV fluid therapy. Antimicrobial choice would ideally be based on culture and sensitivity testing, though the several day turn-around of such tests proves problematic in critical patients. Therefore, empiric antimicrobials should be chosen based on the likelihood of specific bacteria and the organs affected. If the source is a lower urinary tract infection, a beta lactam such as amoxicillin is reasonable. Escalation to a fluoroquinolone or third generation cephalosporin is recommended if pyelonephritis or prostatitis is suspected, though this class of

medications should be reserved for documented microbial resistance in lower urinary tract infections[3].

Patients are hospitalized until fever has resolved, patients are hemodynamically stable, are rehydrated, are well-maintained on oral pain medications, and are eating and able to tolerate oral antimicrobials. Hypotension in volume-repleted patients may require vasopressors. Nutritional supplementation may be necessary with nasogastric or esophagostomy tube feedings. Severe hypoalbuminemia may require plasma administration, though the positive effect of this therapy is limited in larger patients given that large quantities are required to increase albumin. Canine serum albumin may be considered, though availability and cost may be problematic. The development of acute kidney injury warrants very careful IV fluid administration to avoid fluid overload. Coagulopathy may necessitate the administration of fresh frozen plasma[5].

Once bacterial culture results have returned, antimicrobial choices should be re-evaluated and changed depending on patient response and results of susceptibility testing. For lower urinary tract infections, 3-5 days duration of antimicrobial therapy may be adequate. For upper urinary tract infections (pyelonephritis), 10-14 days of antimicrobial therapy is recommended, though previous recommendations have called for 4-6 weeks of therapy. Bacterial prostatitis requires 4-6 weeks of therapy[3]. Various surgical procedures may be required for abscessation of prostate, kidney and testes, and septic uroabdomen in order to decontaminate the infected space and remove the nidus for infection.

Following release from the hospital, patients with positive urinary bacterial cultures should receive repeat aerobic urine culture 5-7 days following the initiation of antimicrobial therapy to ensure efficacy of treatment and again 5-7 days following the cessation of antimicrobial therapy to ensure bacterial infection is no longer present[3].

Survival is excellent in patients without MODS with a mortality rate in appropriately treated dogs of 0%. If MODS is present, 16% mortality rate has been identified and those who survived had fewer organ systems affected[1].

Case History and Presentation

A 15 year-old spayed female italian greyhound presented to the emergency hospital for weakness, difficulty standing, dull mentation and a single episode of inappropriate urination identified at home. Abnormal vital signs on presentation included pyrexia with body temperature registering 41.6 degrees Celsius, tachycardia with heart rate of 180 beats per minute, and hypertension[a] of 174/97 mmHg with a mean arterial pressure of 112 mmHg. Mucous membranes were injected and femoral pulses were bounding. The patient was estimated to be 5% dehydrated. A newly detected grade II/VI left apical holosystolic murmur was ausculted. The patient had dull mentation and was weakly ambulatory with generalized ataxia. Cranial nerve examination was unremarkable and conscious proprioception was present.

Global focused assessment with sonography[b,c] revealed no free fluid in the thorax or abdomen, a left atrial to aortic ratio (LA:Ao) of 1.2 (normal < 1.6) and no gallbladder wall edema (TABLES 1-3). Complete blood count[d] revealed moderate neutrophilia with a regenerative left shift and monocytosis (TABLE 4). Chemistry profile[e] values were all within normal limits, though creatinine was at the high end of the normal range (TABLE 5). Venous blood gas[f] revealed compensated metabolic acidosis given a low normal pH, low base excess, decreased bicarbonate and decreased carbon dioxide. Mild hypokalemia and mild hyperlactatemia were noted (TABLE 6). A heartworm antigen and lyme, anaplasma and ehrlichia antibody test[g] was negative (TABLE 7). Thoracic radiographs (IMAGES 1-3) showed no significant findings. Radiology review by a board-certified radiologist confirmed this (TABLE 8). Urinalysis[h] obtained via cystocentesis revealed low urine specific gravity, marked pyuria and bacteriuria (TABLE 9). A urine culture with antimicrobial susceptibility testing[i] was submitted to an outside lab and

blood culture samples collected from two separate venipuncture sites were obtained prior to antimicrobial therapy.

Case Management and Outcome

A peripheral IV catheter was placed. An IV infusion of balanced crystalloid solution[j] was initiated at a rate calculated to replace 5% dehydration over 36 hours and provide maintenance fluid requirements. A slower fluid rate was chosen given the heart murmur. The patient was given methadone[k] 0.2 mg/kg IV for pain q8h and ampicillin/sublactam[l] 30 mg/kg IV q8h was initiated. Heart rate and blood pressure returned to normal following initiation of pain medication.

Over the following 24 hours, the patient remained significantly pyrexic with temperature remaining over 40.6 degrees Celsius. The heart murmur and ataxia was persistent and unchanged. Neurologic examination remained unremarkable. Enrofloxacin[m] 10 mg/kg IV q24h was added as pyelonephritis could not be ruled out and fever had yet to respond. Ondansetron[n] 0.5 mg/kg IV q12h was added as the patient remained anorexic and nausea was suspected due to ptyalism. The neutrophilia and left shift persisted, but had improved (TABLE 4). Mild hypokalemia had progressed (TABLES 5 and 6) and a potassium chloride[o] constant rate infusion was initiated at 0.2 mEq/kg/hr.

Abdominal ultrasound[p] (TABLE 10, IMAGES 4-8) was performed by a board-certified radiologist and revealed no specific nidus for infection. Chronic renal changes including bilateral decrease in renal corticomedullary distinction and small anechoic cortical cysts were identified. The liver was coarse and mottled, most consistent with nodular regeneration, though inflammatory disease and neoplasia could not be ruled out. Hyperechoic splenic nodules were identified and thought most consistent with splenic myelolipomas.

Over the following 24 hours, pyrexia resolved, pain resolved, ataxia improved and the patient began eating. The ataxia was theorized to be a result of systemic illness and high fever causing weakness. No new neurologic symptoms arose while the patient was hospitalized and

ataxia had resolved after 48 hours of hospitalization. Oral enrofloxacin[q] and amoxicillin with clavulanic acid[r] were prescribed for home administration. The blood cultures previously collected were not submitted given the favorable response to therapy and that a urinary tract infection was confirmed.

The day following discharge from the hospital, an echocardiogram was performed by a board-certified cardiologist to rule out the possibility of vegetative endocarditis, given the new heart murmur (TABLES 11-12, IMAGES 9–12). The patient was found to have mild mitral, tricuspid and aortic valvular regurgitation with no evidence of vegetative lesions and no cardiomegaly.

The day following discharge from the hospital, initial urine culture results returned and revealed *Escherichia coli* growth, with appropriate susceptibility to enrofloxacin (TABLE 13). Amoxicillin with clavulanic acid was discontinued and enrofloxacin was continued. While the bacteria was also sensitive to amoxicillin with clavulanic acid, enrofloxacin was chosen given concern for possible pyelonephritis. Urine culture with sensitivity was repeated seven days after initiation of antimicrobial therapy and again seven days after cessation of antimicrobial therapy. No further bacterial growth was identified (TABLE 13). The patient was treated with enrofloxacin for a total of 14 days.

Endnotes

a. Indirect blood pressure: Sun Tech Vet25; SunTech Medical; Morrisville, NC.

b. Global focused assessment with ultrasound: Global FAST™, trademark Lisciandro Enterprises, PLLC; San Antonio, TX.

c. Ultrasound machine: SonoSite Edge II Ultrasound Systems; Fujifilm Sonosite, Inc; Bothell, WA.

d. Hematology analyzer: Procyte Dx, IDEXX laboratories; Westbrook, ME.

e. Chemistry analyzer: Catalyst One®, IDEXX laboratories; Westbrook, ME.

f. Blood gas analysis: Siemens Rapid Point 500®, Siemens Medical Solutions USA, Inc.; Malvern, PA.

g. SNAP 4Dx® Plus test: IDEXX laboratories; Westbrook, ME.

h. Urinalysis: IDEXX reference laboratories; Westbrook, ME.

i. Urine culture/MIC: IDEXX reference laboratories; Westbrook, ME.

j. Crystalloid solution: Plasmalyte; Laboratorios Biogalenic S.A. de CV; Soyapango, El Salvador.

k. Methadone 10mg/ml injectable: Mylan Institutional LLC; Morgantown, WV.

l. Ampicillin/Sublactam injectable: Unasyn®; distributed by Eugia US LLC, Windsor, NJ; neutral code no. TS/DRUGS/07/2016; manufactured in India.

m. Enrofloxacin 22.7 mg/ml injectable: distributed by Covetrus North America, Dublin, OH; neutral code no. PON/DRUGS/08 22 2288; manufactured in India.

n. Ondansetron 2 mg/ml injectable: Hikma Pharmaceuticals USA Inc; Berkeley Heights, NJ.

o. Potassium chloride 2 mEq/ml injectable: Emcure Pharmaceuticals Ltd; Sanand, Ahmedabad, India.

p. Ultrasound: UL APLIO A450, model CUS-AA450/HN; Canon Medical Systems USA Inc.; Tustin, CA.

q. Enrofloxacin 68 mg Tablets: distributed by Dechra Veterinary Products, Overland Park, KS; neutral code no. Drugs/TS/32/2008; manufactured in India.

r. Amoxicillin with clavulanic acid: Clavamox 62.5mg tablets; Haupt Pharma Latina; Borgo San Michele LT, Italy.

References

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2. Mervyn Singer MD, Deutschman CS, Seymour CW, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3). *J Am Med Assoc.* 2016;315(8):801-810.
3. Weese, JS, Blondeau J, Boothe D, et al. International Society of Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. *Vet J*. 2019; 247:8-25.
4. Bouillon J, Snead E, Caswell J, et al. Pyelonephritis in Dogs: Retrospective Study of 47 Histologically Diagnosed Cases (2005–2015). *J Vet Intern Med.* 2018;32:249–259.
5. Silverstein D, Otto CM. Sepsis. In: Greene CE. *Infectious Diseases of the Dog and Cat*. 5th ed. St Louis: Elsevier; 2022. p.1603-1621.

TABLE 1: Abdominal focused assessment with sonogragraphy (AFAST)

Patient positioning	standing

Gallbladder	unremarkable
Urinary bladder	unremarkable

DH view

Pleural effusion	absent
Pericardial effusion	absent
Caudal vena cava	unremarkable
Hepatic venous distension	none seen

AFAST fluid scoring

DH	0
SR/HR	0
CC	0
SI Umbilical	0

Total abdominal fluid score 0-4: 0

HR 5th view	0

Focused spleen	0

TABLE 2: Thoracic focused assessment with sonography (TFAST)

Pneumothorax	absent
Pleural effusion	absent
Pericardial effusion	absent

Echo views

LA:Ao ratio	1.2
Caudal vena cava	unremarkable
Hepatic venous distension	none seen

Table 3: Veterinary bedside lung ultrasound exam (VET Blue)

Left

	B-lines	Shred	Tissue	Nodule	Wedge
Cd	0	0	0	0	0
Ph	0	0	0	0	0
Md	0	0	0	0	0
Cr	0	0	0	0	0

Right

	B-lines	Shred	Tissue	Nodule	Wedge
Cd	0	0	0	0	0
Ph	0	0	0	0	0
Md	0	0	0	0	0
Cr	0	0	0	0	0

	B-Lines	Shred	Tissue	Nodule	Wedge
DH	0	0	0	0	0

TABLE 4: Complete blood count comparison chart

Test	Result, Day 1	Result, Day 2	Unit	Lowest Value	Highest Value
RBC	6.02	**5.64 (L)**	M/uL	5.65	8.87
HCT	39.5	**36.5 (L)**	%	37.3	61.7
HGB	14.3	13.2	g/dL	13.1	20.5
MCV	65.6	64.7	fL	61.6	73.5
MCH	23.8	23.4	pg	21.2	25.9
MCHC	36.2	36.2	g/dL	32	37.9
RDW	14.8	14.2	%	13.6	21.7
%Retic	0.3	0.3	%		
Retic	18.7	14.7	K/uL	10	110
Retic-HGB	**20.6 (L)**	**20.2 (L)**	pg	22.3	29.6
WBC	**24.56 (H)**	16.14	K/uL	5.05	16.76
%Neut	84.8	80.9	%		
%Lymph	6.8	6.8	%		
%Mono	8.2	12.2	%		
%Eos	0.1	0.1	%		
%Baso	0.1	0.0	%		
Neut	**22.15 (H)**	**13.07 (H)**	K/uL	2.95	11.64
Bands	**suspected**	**suspected**			
Lymph	1.08	1.09	K/uL	1.05	5.1
Mono	**1.31 (H)**	**1.97 (H)**	K/uL	0.16	1.12
Eos	**0.01 (L)**	**0.01 (L)**	K/uL	0.06	1.23
Baso	0.01	0.0	K/uL	0	0.1
PLT	229	148	K/uL	148	484
MPV	12.2	**13.5 (H)**	fL	8.7	13.2
PDW	10.7	12.1	fL	9.1	19.4
PCT	0.28	0.2	%	0.14	0.46

Differential of CBC

Bands	**7.8 (H)**	**4.84 (H)**	K/uL	0	0.1
Seg	**15.1 (H)**	8.39	K/uL	2.95	11.64
Baso	0	0	K/uL	0	0.1
Eos	0.21	0.16	K/uL	0.06	1.23
Lymph	**0.53 (L)**	**0.65 (L)**	K/uL	1.05	5.1
Mono	0.96	**2.1 (H)**	K/uL	0.16	1.12

NOTE: Neutrophils on day 1 were mildly toxic with a left shift.

TABLE 5: Chemistry profile comparison chart

Test	Day 1 Result	Day 2 Result	Unit	Lowest Value	Highest Value
Glucose	92	115	mg/dL	70	143
Creat	1.8	1.2	mg/dL	0.5	1.8
BUN	12	11	mg/dL	7	27
BUN/Creat	9	9			
Phos	3.8	3.8	mg/dL	2.5	6.8
Ca	8.7	8.6	mg/dL	7.9	12
Total Protein	7.2	6.9	g/dL	5.2	8.2
Alb	2.9	2.6	g/dL	2.2	3.9
Glob	4.3	4.3	g/dL	2.5	4.5
Alb/Glob	0.7	0.6			
ALT	98	67	U/L	10	125
ALKP	62	165	U/L	23	212
GGT	0	0	U/L	0	11
Tbil	0.7	0.3	mg/dL	0	0.9
Chol	212	227	mg/dL	110	320
Na+		150	mmol/L	144	160
K+		**3.2 (L)**	mmol/L	3.5	5.8
Cl-		111	mmol/L	109	122

TABLE 6: Venous blood gas comparison chart

Test	Day 1 Result	Day 2 Result	Unit	Lowest Value	Highest Value
FiO2	21	21	%		
cHCO3act	**18.8 (L)**	22.2	mmol/L	20.0	24.0
cBE(w)	**-6.0 (L)**	-1.6	mmol/L	-2.3	0.3
cAnGap	20.8	16.0	mmol/L	13.0	27.0
cO2SAT	**74.8 (H)**	**49.2 (L)**	%	50.0	60.0
cHct	44	33	%	36	55
pH	7.399	7.449		7.350	7.450
pCO2	**31.2 (L)**	**33.6 (L)**	mmHg	34.0	42.0
PO2	39.3	**24.7 (L)**	mmHg	30.0	42.0
Na+	147.7	147.8	mmol/L	142.0	153.0
K+	**3.95 (L)**	**3.7 (L)**	mmol/L	4.1	5.0
Ca++	1.17	1.2	mmol/L	1.04	1.33
Cl-	112	113	mmol/L	105	116
Glu	85	82	mg/dL	63	118
Lact	**2.87 (H)**	1.23	mmol/L	0.5	2.0
tHb	15.1	**11.1 (L)**	g/dL	13.0	18.0

Packed cell volume and total solids comparison chart

	Day 1 Result	Day 2 Result	Day 7 Result	Unit	Lowest Value	Highest Value
PCV	42	37	**36 (L)**	%	37	55
TS	7.4	7.4	6.4	g/dL	5.0	8.0
Hemolysis	trace	0	0			
Icterus	0	0	0			
Lipemia	0	0	0			
Buffy coat	<1	<1	<1	%		

TABLE 7: Results of heartworm, lyme, ehrlichia and anaplasma test

Heartworm antigen	negative
Lyme antibody	negative
Ehrlichia antibody	negative
Anaplasma antibody	negative

IMAGE 1: Three view thoracic radiographic study, right lateral projection

Normal geriatric thorax.

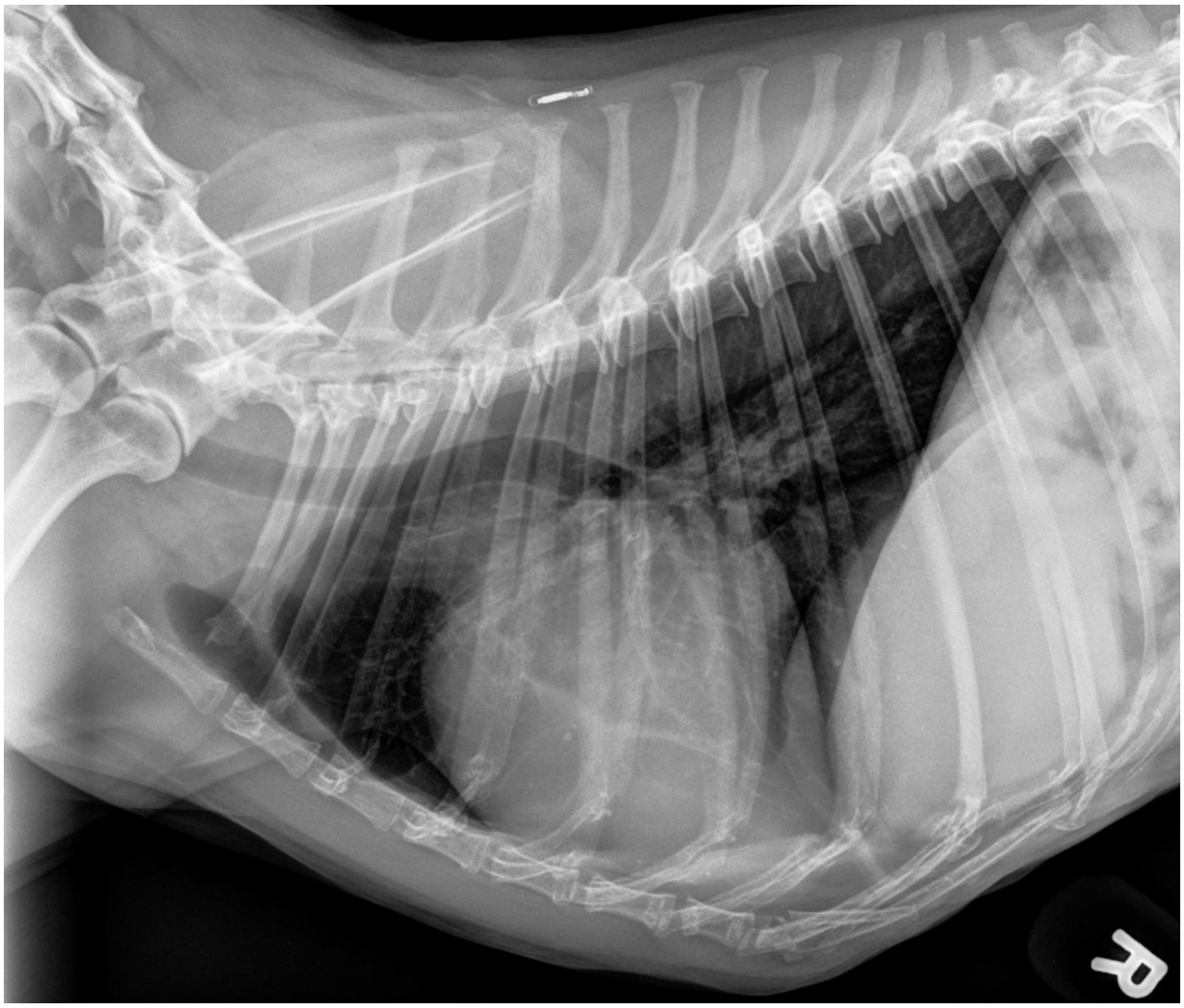


IMAGE 2: Three view thoracic radiographic study, left lateral projection

Normal geriatric thorax.

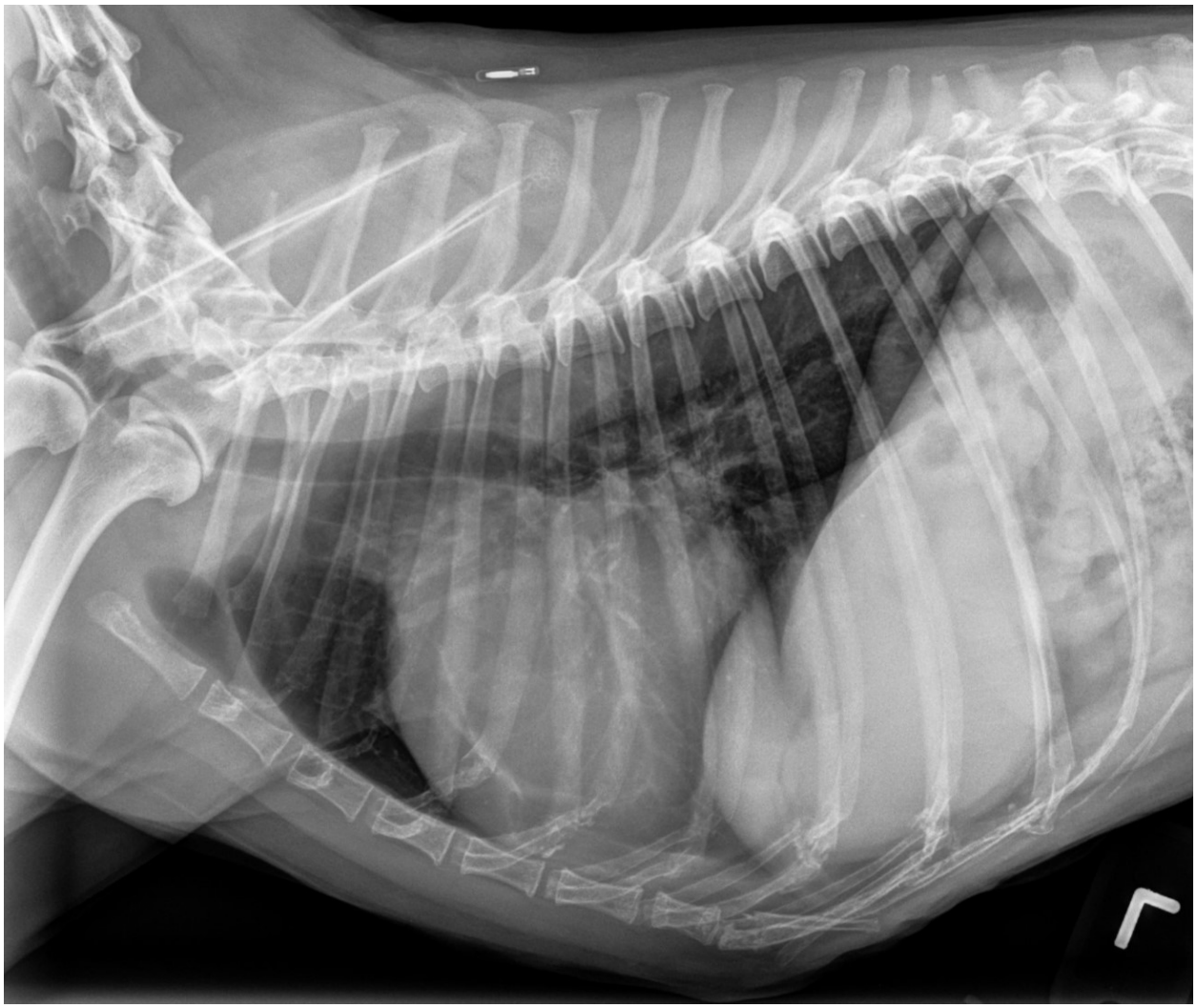


IMAGE 3: Three view thoracic radiographic study, ventrodorsal projection

Normal geriatric thorax.

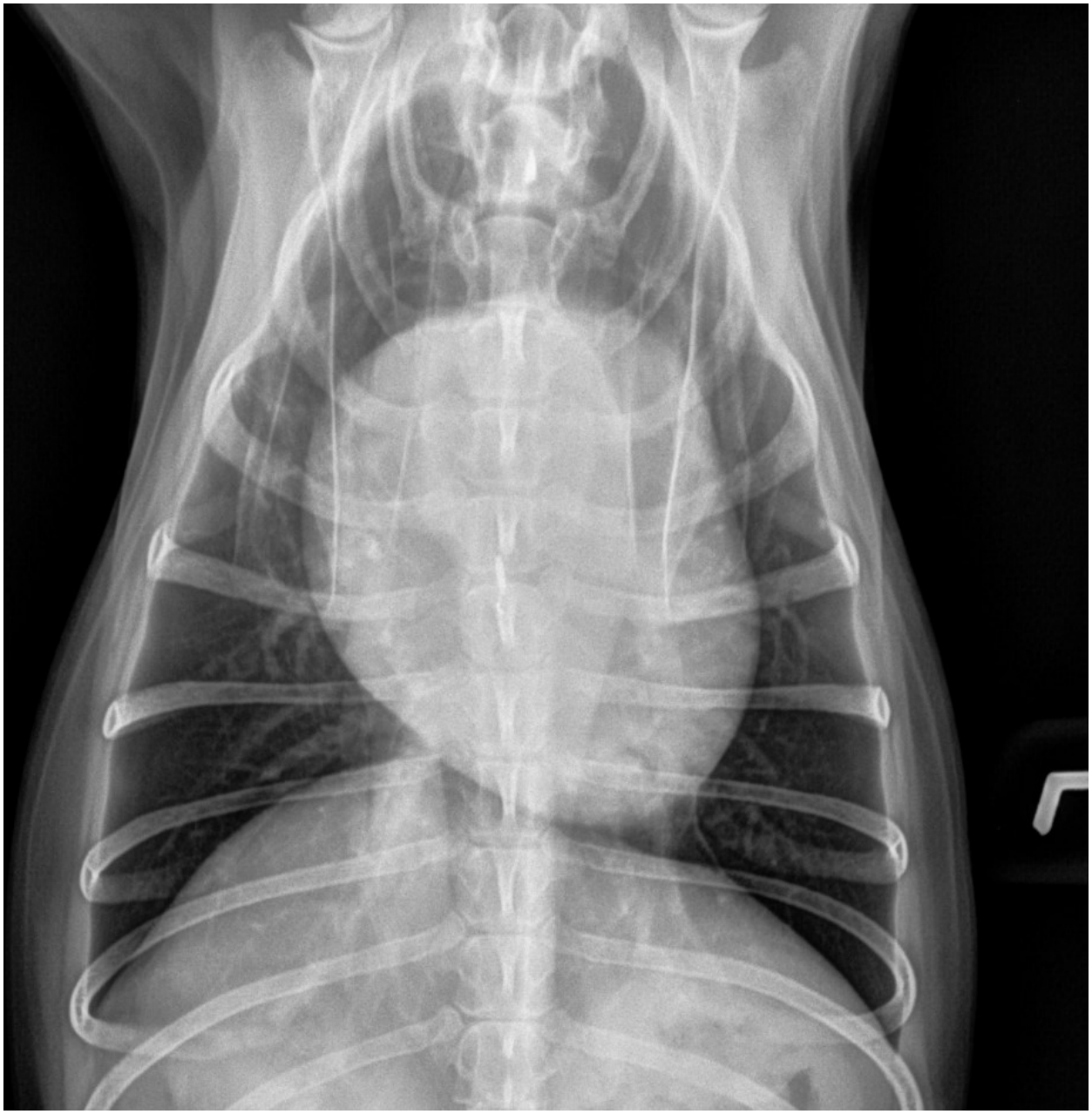


TABLE 8: Radiology report, thoracic three-view radiographs

Findings: A three-view study of the thorax is available for interpretation. The heart is a normal size and shape, without evidence of chamber enlargement. The pulmonary arteries and veins are matched for size and have a normal branching and tapering shape. There is no widening or increased opacity of the mediastinum. The trachea is a uniform diameter throughout its length. Small, very opaque pulmonary nodules represent a combination of end-on blood vessels and benign pulmonary osteomas. No soft tissue opaque pulmonary nodules or areas of infiltrate are identified. The extrathoracic musculoskeletal structures are unremarkable. The included cervical vertebrae are normal. Serosal detail in the cranial abdomen is adequate.

Conclusions: Normal geriatric thorax.

TABLE 9: Urinalysis, day 1

	Result, day 1
Collection	Cysto
Color	yellow
Clarity	cloudy
Specific Gravity	1.014
pH	5.5
Urine protein	1+
Glucose	Negative
Ketones	Negative
Blood/hemoglobin	1+
Bilirubin	Negative
Urobilinogen	Negative
White blood cells	>100/HPF
Red blood cells	20-30/HPF
Bacteria	Marked rods >40/HPF
Epithelial cells	Rare 0-1
Mucus	Present
Casts	None seen
Crystals	None seen

TABLE 10: Ultrasound report

Findings:
LIVER: The liver is of normal size and shape. It appears diffusely coarse and mottled in echotexture (IMAGE 4). There are no masses or other irregularities noted within the hepatic parenchyma. The gall bladder is small, displaced dorsally, and the wall appears hyperechoic (IMAGE 5). Gallbladder wall thickness appears normal. There is no evidence of biliary obstruction present.
SPLEEN: The spleen is of normal size and shape and there is adequate blood flow noted within the visualized splenic vasculature. Width measures: 1.32 cm. There are several small hyperechoic nodules at the hilus (IMAGE 6). The serosal margin of the spleen appears smooth and regular.
KIDNEYS: The kidneys measure normal in size bilaterally (L:4.68 cm, R:4.29 cm). There is decreased corticomedullary definition identified on each side and the serosal surface is smooth and regular. There are small anechoic cortical cysts present bilaterally (IMAGES 7-8). There is no renal pelvis dilation. There is no evidence of ureteral obstruction.
ADRENAL GLANDS: Left measures: 0.7 cm. Right measures 0.64 cm. Normal size, shape, and echogenicity.
BLADDER: Normal wall thickness and moderately distended with anechoic urine. There is no evidence of cystic calculi or intraluminal defects/masses. The urethra is seen tapering normally to the level of the pelvis.
GASTROINTESTINAL: The stomach contains a mild amount of gas causing some shadowing within the cranial abdomen. There are no intraluminal filling defects noted and the gastric walls have intact layering. There is intact wall layering within the small intestine and appropriate thickness. There is no evidence of intestinal obstruction. The colon contains a moderate amount of watery feces.
PANCREAS: Visualized and unremarkable.
OTHER COMMENTS: There is no evidence of peritoneal effusion or mesenteric lymphadenopathy present.

Conclusions:
- Coarse/mottle liver - r/o nodular regeneration, hepatitis, infiltrative neoplasia
- Gall bladder changes (hyperechoic wall, dorsal displacement) - may be an incidental finding, cholecystitis cannot be excluded.
- Chronic kidney disease changes bilaterally, small cortical cysts
- Hyperechoic splenic nodules consistent with splenic myelolipomas
- Impending diarrhea

IMAGE 4: Abdominal ultrasound image, liver with diffusely coarse and mottled echotexture

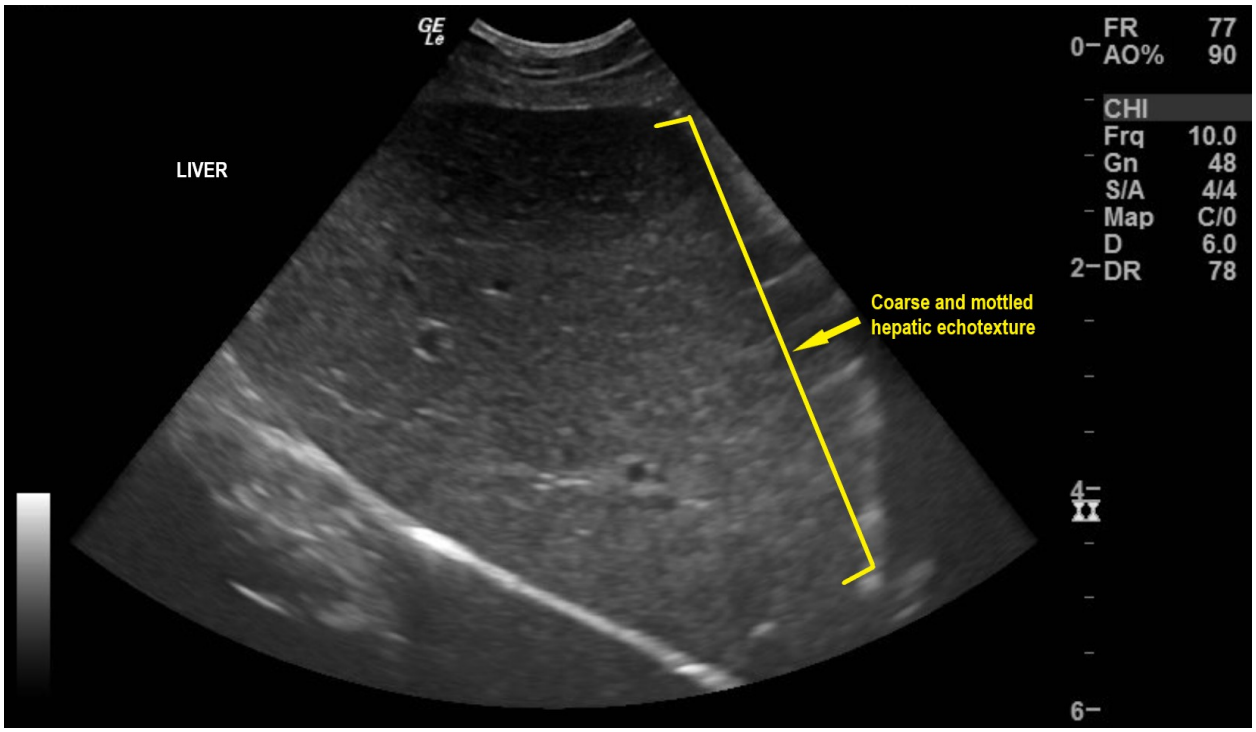


IMAGE 5: Abdominal ultrasound image, gallbladder with hyperechoic wall

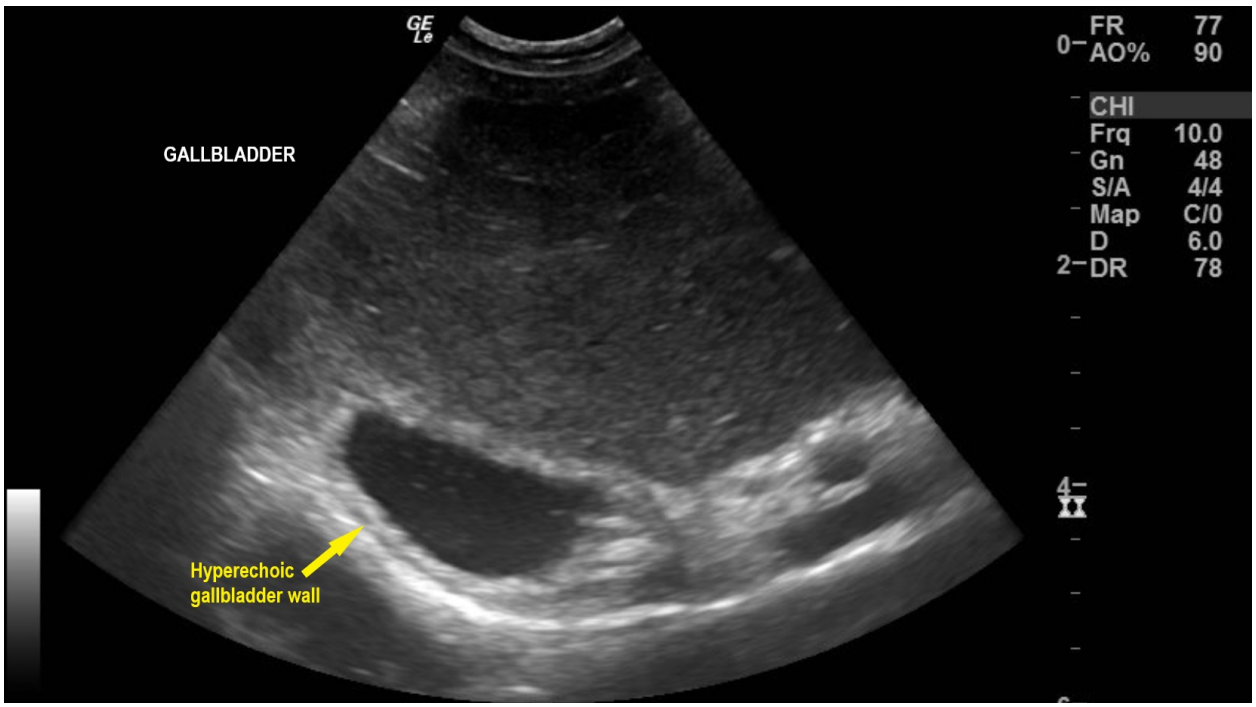
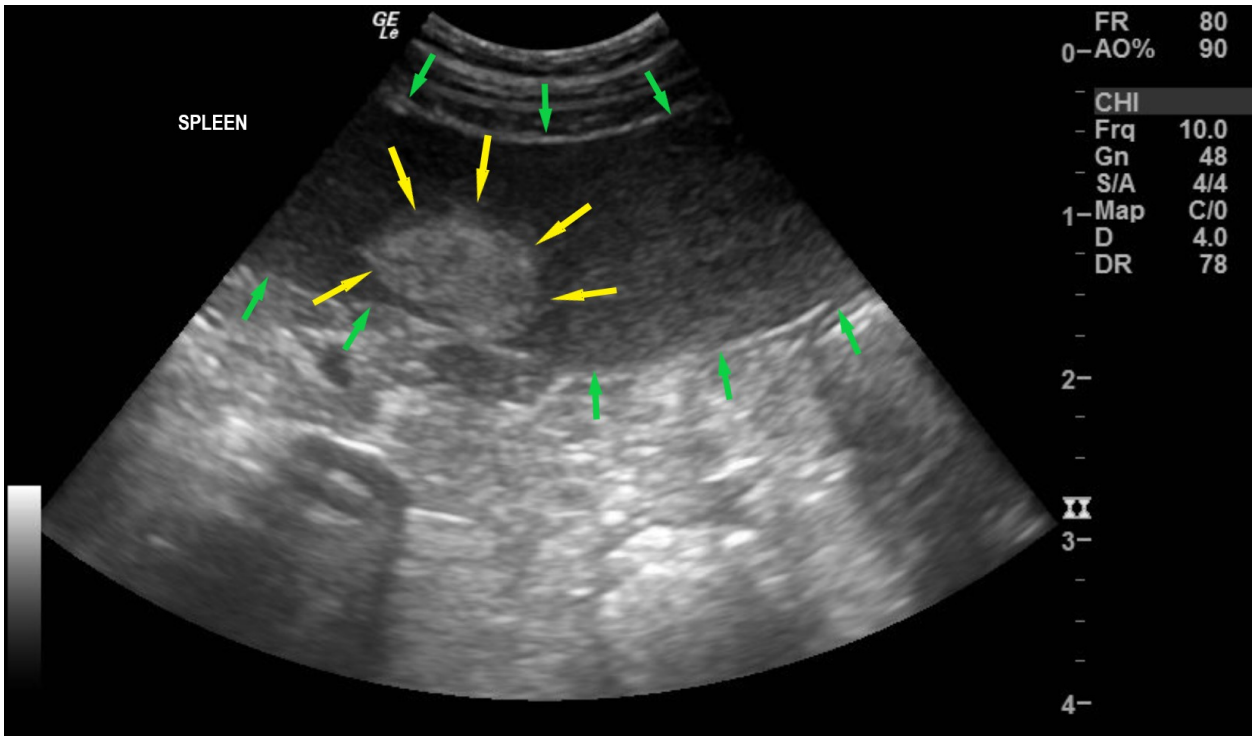


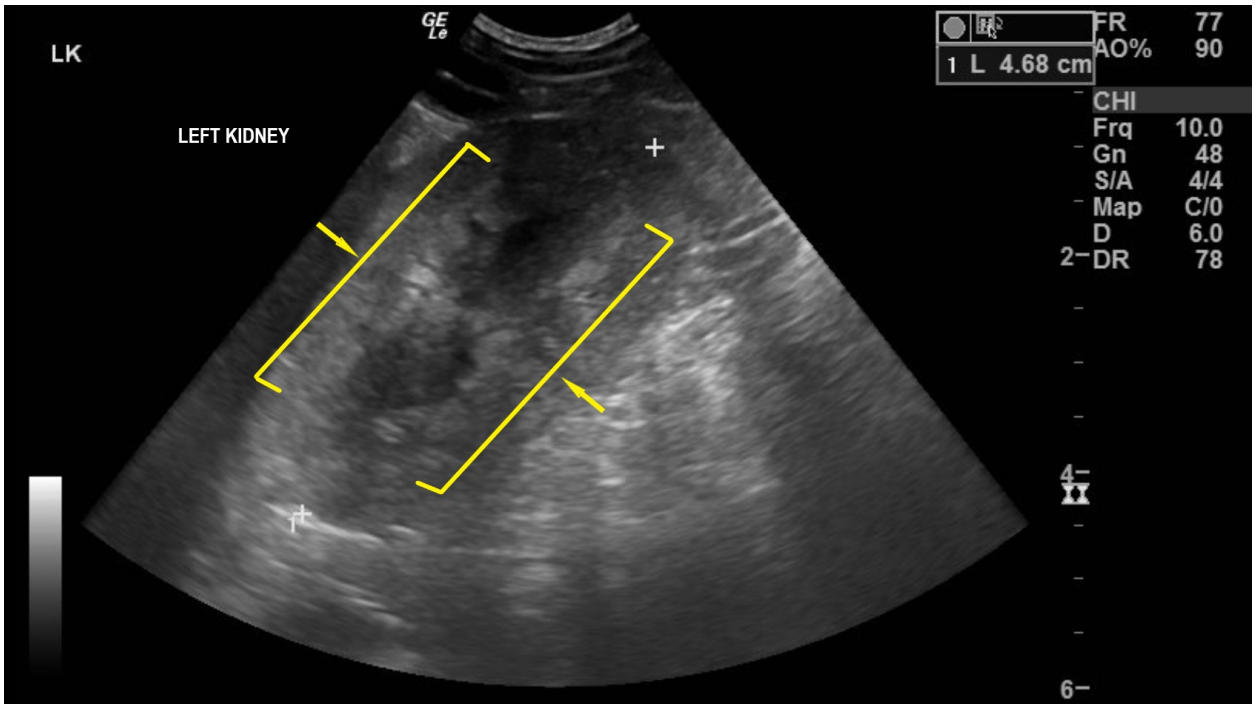
IMAGE 6: Abdominal ultrasound image, spleen with hyperechoic nodule



Yellow arrows indicate hyperechoic splenic nodule.

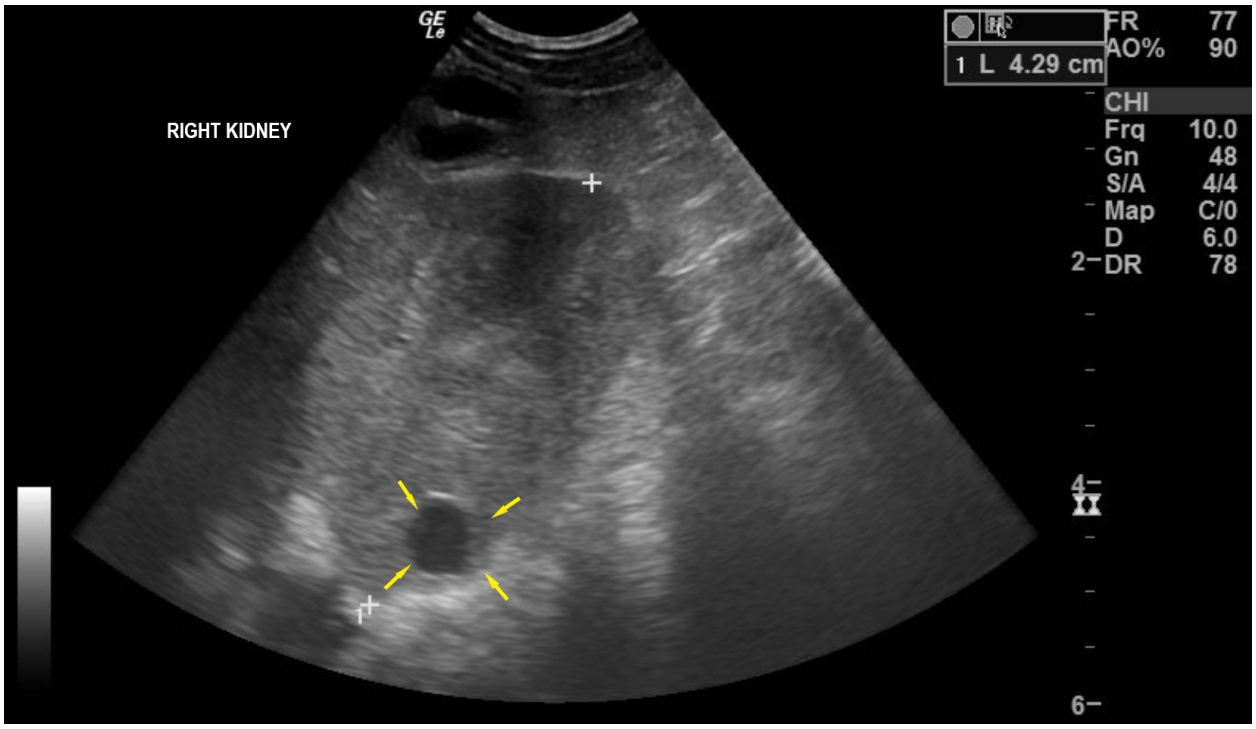
Green arrows indicate splenic margins.

IMAGE 7: Abdominal ultrasound image, left kidney



Yellow arrows indicate poor corticomedullary distinction.

IMAGE 8: Abdominal ultrasound, right kidney



Yellow arrows indicate cortical cyst.

TABLE 11: Echocardiographic report

Echocardiographic assessment: The left ventricle is normal in structure and function. The mitral valve is mildly thickened (IMAGE 10). The chordal attachments appear normal. There is trace mitral regurgitation. The left atrium is normal in size. The pulmonary veins are normal in size. The aortic valve appears normal. There is trace aortic insufficiency (IMAGE 11). The aortic velocity is normal. The right ventricle is normal. The tricuspid valve is mildly thickened with septal leaflet prolapse (IMAGE 12). There is trace tricuspid regurgitation (IMAGE 13). The pulmonary arterial pressure estimate is normal. The right atrium is normal in appearance. The pulmonic valve is normal in appearance. The pulmonic forward flow is normal. The pulmonary arteries are normal in appearance.

Conclusion: Diagnosis: Mild valvular degeneration Very mild valvular degeneration of the mitral, aortic and tricuspid valves is noted. The patient is very well compensated at this time. There is no evidence of bacterial endocarditis on this study but it cannot be completely ruled out either.

TABLE 12: Echocardiographic parameters

2D	
Value	Unit
LA	19 mm
Ao	15 mm
LA:Ao	1.27

M-Mode	
Value	Unit
IVSd	7.88 mm
LVIDd	28.7 mm
LVPWd	9.15 mm
LVIDs	15.0 mm
FS	47.7 %
LVIDdN	1.6

Doppler	
Value	Unit
AV vel	1.16 m/s
PV vel	0.83 m/s
TR vel	2.96 m/s
PG	35 mm Hg
Mitral E	0.53 m/s
Mitral A	1.06 m/s
E/A	0.5

IMAGE 9: Echocardiogram, right parasternal long axis four chamber view

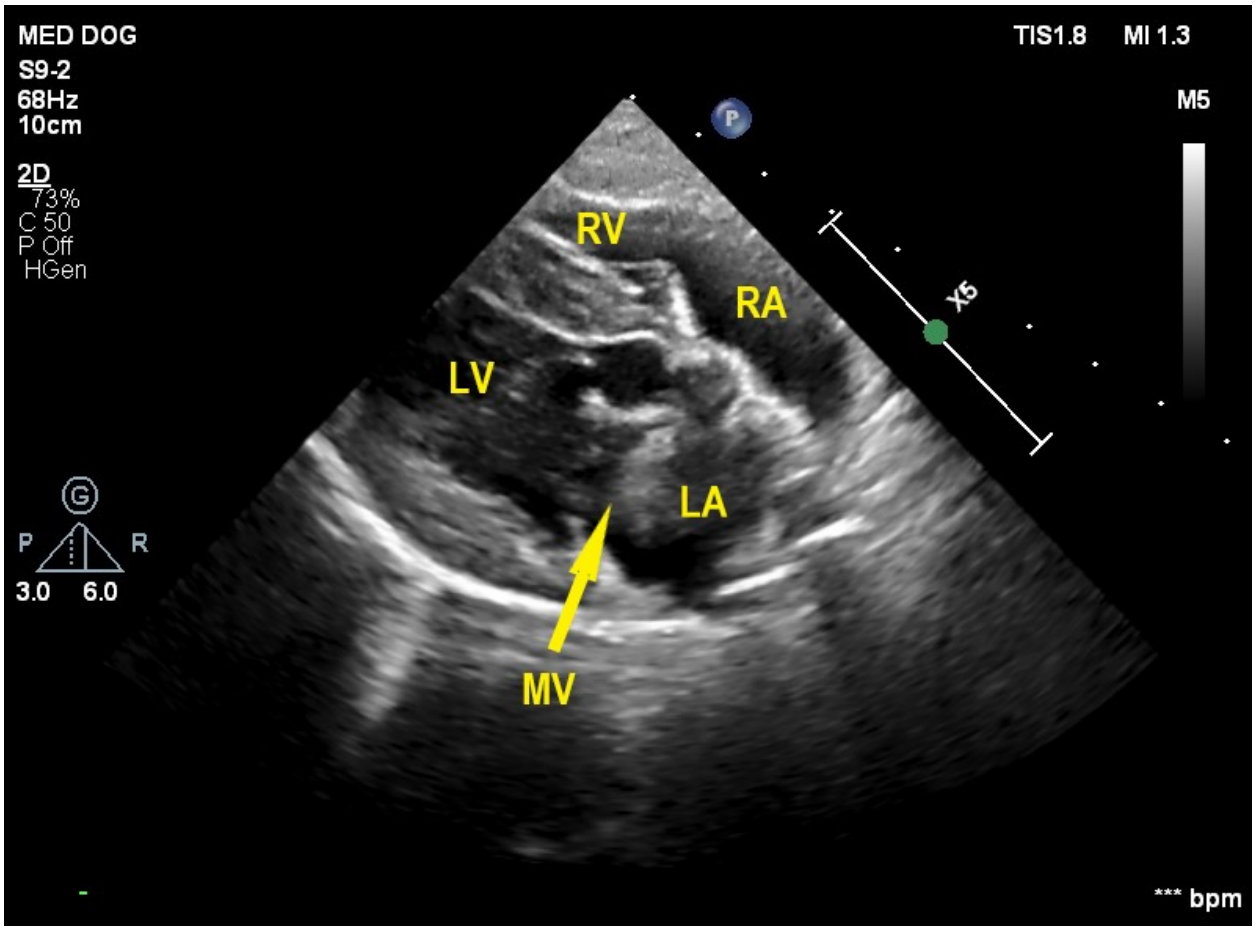
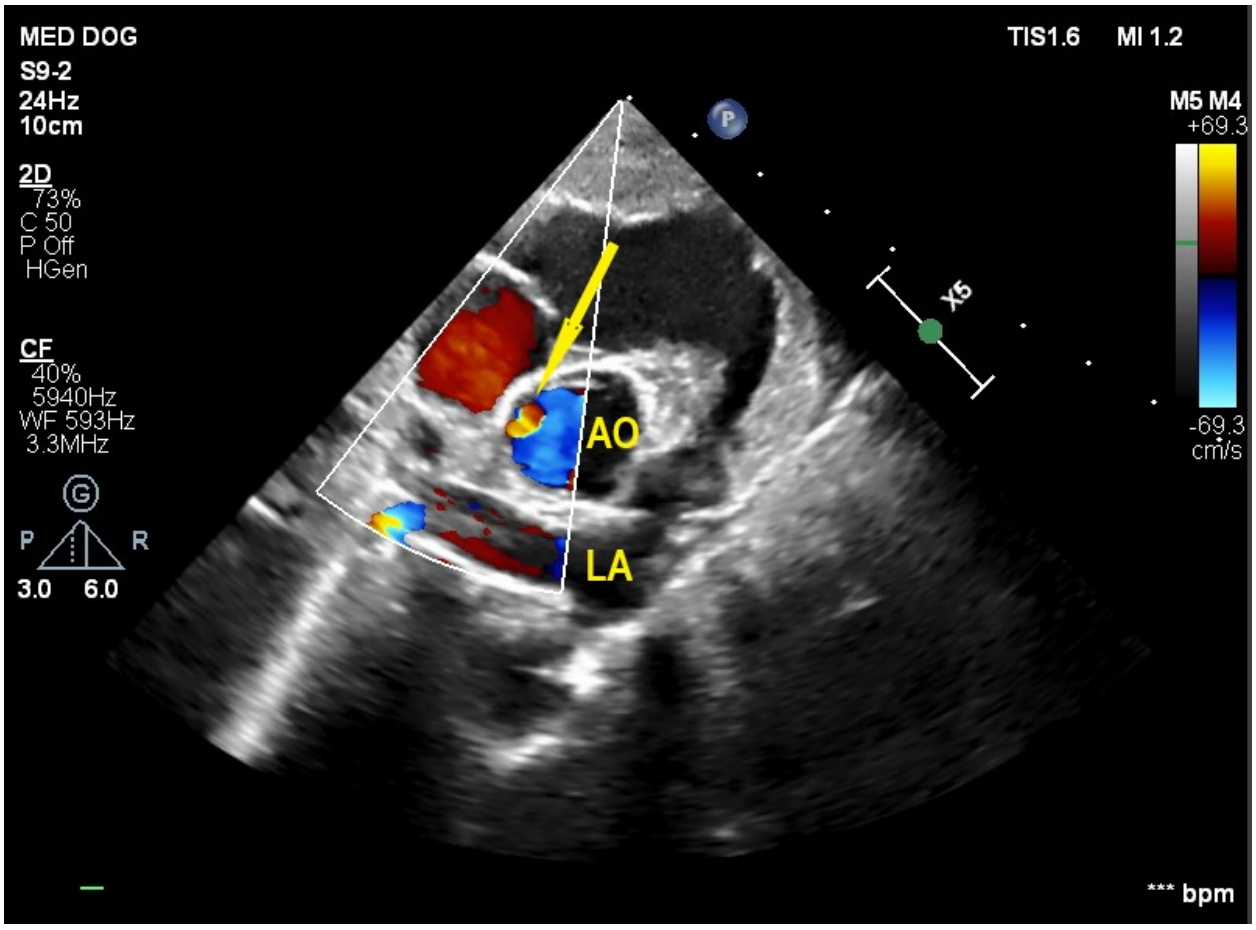


Image depicts mild mitral valve thickening.

Legend:
LV = left ventricle
LA = left atrium
RV = right ventricle
RA = right atrium
MV = mitral valve

IMAGE 10: Echocardiogram, right parasternal short axis basilar view, color doppler



Yellow arrow indicates mild aortic insufficiency.

Legend:
LA = left atrium
AO = aorta

IMAGE 11: Echocardiogram, right parasternal long axis four chamber view

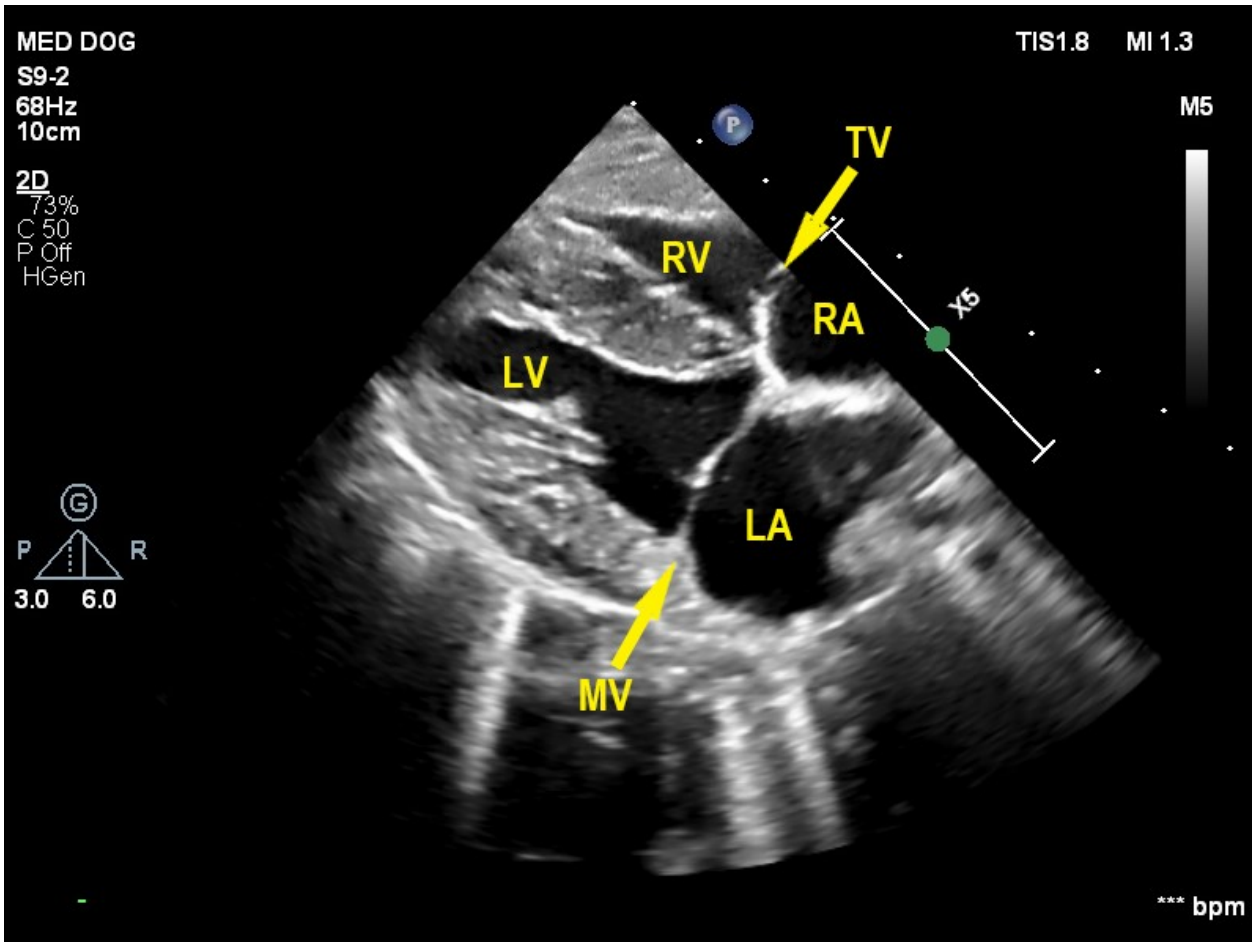
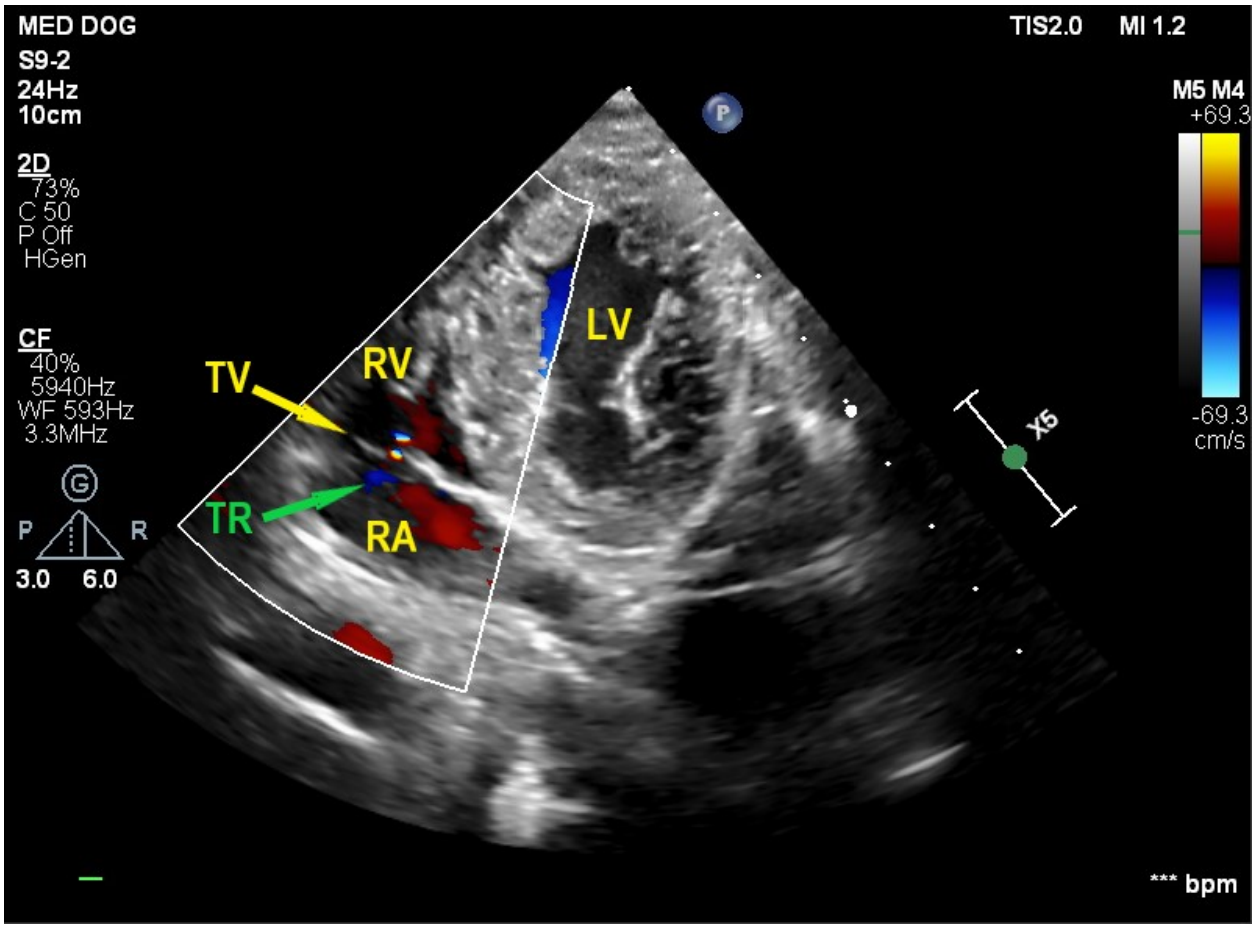


Image depicts mild tricuspid valve thickening.

Legend:
LV = left ventricle
LA = left atrium
RV = right ventricle
RA = right atrium
MV = mitral valve
TV = tricuspid valve

IMAGE 12: Echocardiogram, left apical view



Green arrow indicates tricuspid regurgitation.

Legend:
LV = left ventricle
RV = right ventricle
RA = right atrium
TV = tricuspid valve
TR = tricuspid regurgitation

TABLE 13: Urine culture and sensitivity comparison chart

Urine culture results, Day 1 - Bacterial growth: E. coli >100,000 CFU/ml		
Antimicrobial	Sensitivity	MIC
Amoxicillin	R	32
Amoxicillin-Clavulanic acid	S	8
Cephalexin	S	8
Cefpodoxime	S	0.25
Ceftazadime	S	0.5
ceftiofur	S	0.12
Imipenem/Carbapenem	S	1
Amikacin	S	0.25
Gentamicin	R	2
Ciprofloxacin	S	16
Enrofloxacin	S	0.5
Marbofloxacin	S	0.5
Doxycycline	R	0.5
Nitrofurantoin	S	
Chloramphenicol	S	16
Trimethoprim/sulfamethoxazole	R	4
Cefotaxime	S	320

Urine culture results, day 7: No growth

Urine culture results, day 21: No growth