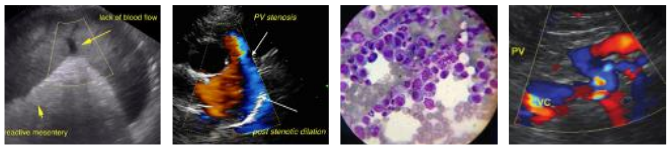
SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT
Junior Del Carlo

SPECIES
Canine

BREED
Golden Doodle

SEX
Neutered Male

AGE
10 Years

WEIGHT
114 Lbs.

INTERPRETED BY
Eric Lindquist, DMV DABVP, Cert. IVUSS

IMAGING PERFORMED BY
Debbie White, DVM

HOSPITAL NAME
Lone Mtn. AH

REFERRING VET
Debbie White, DVM

INVOICE
13195

DATE
12/28/21

PRESENTING CLINICAL SIGNS

History: diagnosed with juvenile renal dysplasia as a puppy. has done well for many years and eventually developed proteinuria and hypertension. currently on benazepril 20mg 2 po bid, amlodipine 5mg 1.5 tab po bid presented for several week history of declining appetite, increasing lethargy and sleeping alot. vomited food and bile once. polyuria and polydipsia noted but no dysuria. owner notes mobility issues and daily episodes of paraphimosis which resolves on its own per owner. hisotory of chronic gi issues- prone to diarrhea per owner

Abnormal PE/Chem/CBC/UA Results: PE: obese, BCS 4.5/5. lethargic. parphimosis easily resolved during exam but reoccurs throughout visit 12/27/21 Xray chest/abdomen report: misshapen irregular right kidney. Ovoid soft tissue opacity caudal to gastric margin on right lateral view- summation, artifact vs cranial abdominal mass. Loss of peritoneal detail in midabdomen with wispy soft tissue streaking- artifact vs peritonitis and/or effusion. mild bronchial pattern likely age related. hip dysplasia with moderate degenerative disease. 12/27/21 cbc/chem: amylase-1203, decr tbili<0.1, incr bun-101, incr phosp=7, incr creat=4.6. rest of labwork values normal UA sg 1.017, ph=5.5, 3+ protein, 1+ occult blood UPC, urine culture pending 9/23/21 UPC=1.7, BP range 140-170 7/19/21 UPC=2.3, BP range 120-165 7/20/21 UPC=2.3

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.

The **left kidney** revealed significant dysplastic changes with pyelectasia and nodular cortical irregularities with diffuse interstitial nephrosis pattern. Cortical cysts were noted. The left kidney measured 5 cm. The **right kidney** revealed cortical cysts. The right kidney measured 5 cm. Cortical infarcts were also noted with cortical collapse and displaced renal pelvises.

Adrenal Glands

The **adrenal glands** were not visualized.

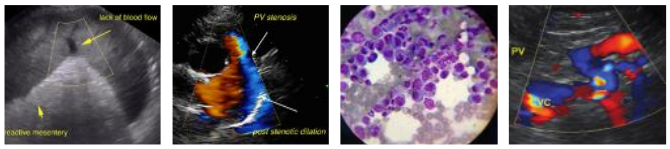
Spleen

The **spleen** presented a smooth homogeneous parenchyma hyperechoic to liver and renal cortical parenchyma. The capsule was smooth without noticeable expansion or deviation from within the spleen or adjacent pathology. The splenic vasculature demonstrated normal volume without signs of congestion or thrombosis. No sonographic evidence of acute or chronic inflammatory, neoplastic, or infarctual changes were noted.

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.

SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT

Junior Del Carlo

SPECIES

Canine

BREED

Golden Doodle

SEX

Neutered Male

AGE

10 Years

WEIGHT

114 Lbs.

INTERPRETED BY

Eric Lindquist, DMV DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Debbie White, DVM

HOSPITAL NAME

Lone Mtn. AH

REFERRING VET

Debbie White, DVM

INVOICE

13195

DATE

12/28/21

Gastrointestinal

The **gastrointestinal tract** revealed minor variable thickening and echogenic submucosal changes most consistent with low grade end result of mild chronic GI disease such as IBD and may be related to malassimilation of nutrients if any weight loss is present. No obvious neoplastic patterns were noted and luminal content as unremarkable.

Pancreas

The base and limbs of the **pancreas** were observed to be largely isoechoic to surrounding omental fat. Pancreatic duct and capsular contour were acceptably normal and parenchyma respected normal curvilinear patterns. No overt evidence of active inflammatory or neoplastic disease was noted.

ULTRASONOGRAPHIC FINDINGS

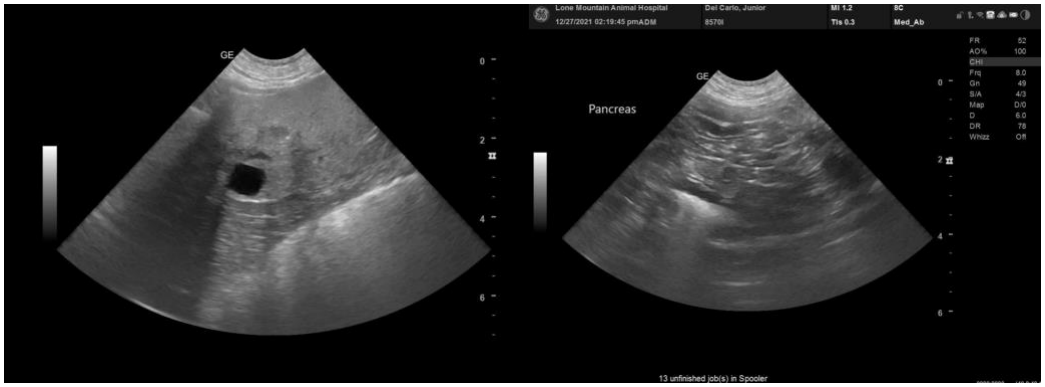
- Primary renal dysplasia pattern with secondary degenerative changes, infarcts and remodeling with polycystic cortices.

INTERPRETATION OF THE FINDINGS & FURTHER RECOMMENDATIONS

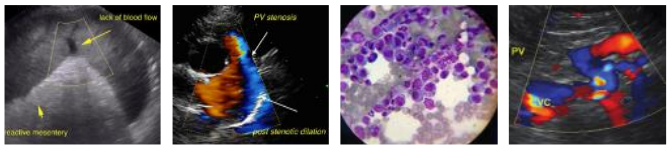
Supportive care would be recommended for end stage renal failure, acute on chronic presentation. However, prognosis long-term is poor, depending upon any response to therapy. Urine culture and sensitivity indicated. 72-hour aggressive IV fluid protocol and reassessment of the azotemia warranted.

For an additional charge, internal medicine consult can be utilized through Sonopath.com. You can select the internal medicine drop down at http://spa.sonopath.com/.

One of the world's top internists & SonoPath associate Dr. Remo Lobetti BVSc, MMedVet, PhD, DECVIM can evaluate your case through SonoPath. https://sonopath.com/resources/sonopath-services/internal-medicine-teleconsultation-services



SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT

Junior Del Carlo

SPECIES

Canine

BREED

Golden Doodle

SEX

Neutered Male

AGE

10 Years

WEIGHT

114 Lbs.

INTERPRETED BY

Eric Lindquist, DMV DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Debbie White, DVM

HOSPITAL NAME

Lone Mtn. AH

REFERRING VET

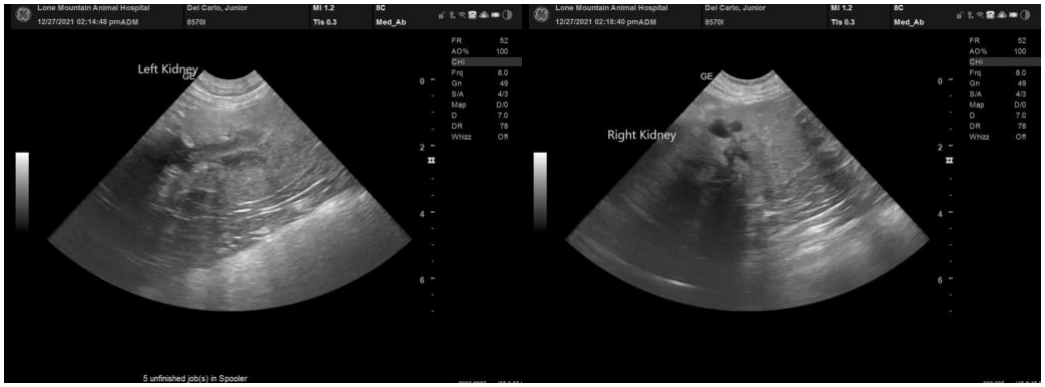
Debbie White, DVM

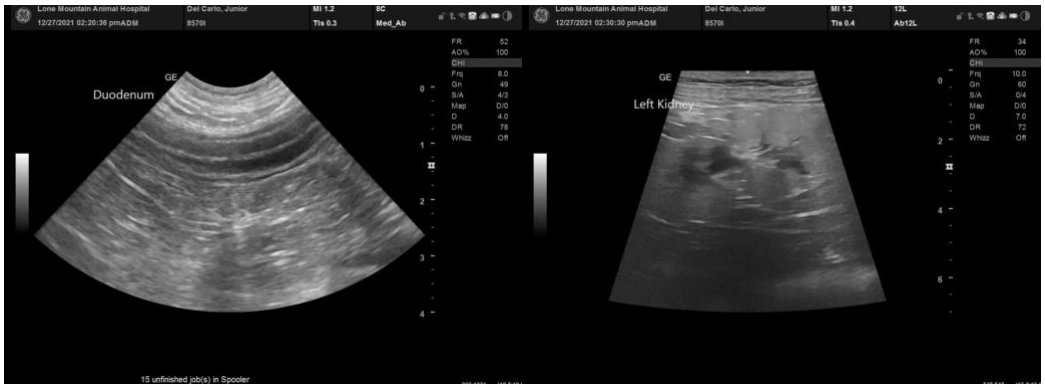
INVOICE

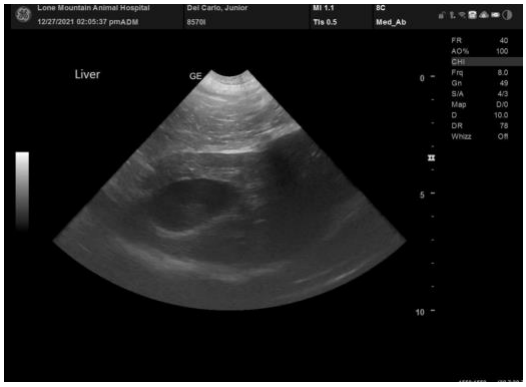
13195

DATE

12/28/21







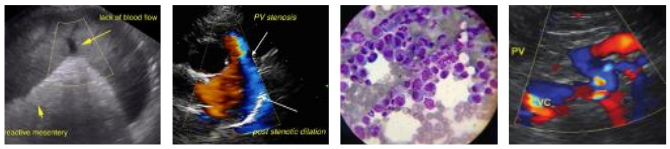
The information and recommendations provided are based on the images presented by the referring veterinarian. No evaluation can be communicated regarding pathology that was not visible in the image/video clips provided.

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
info@SonoPath.com

Acute Renal Failure

SonoPath
Clinical Sonography & Telecytology
EDUCATIONAL TELECONSULTATION SERVICES™



SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT

Junior Del Carlo

SPECIES

Canine

BREED

Golden Doodle

SEX

Neutered Male

AGE

10 Years

WEIGHT

114 Lbs.

INTERPRETED BY

Eric Lindquist, DMV DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Debbie White, DVM

HOSPITAL NAME

Lone Mtn. AH

REFERRING VET

Debbie White, DVM

INVOICE

13195

DATE

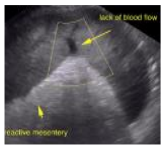
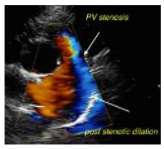
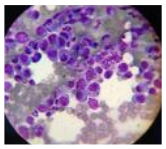
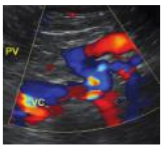
12/28/21

http://www.sonopath.com/ARF

Description: Acute renal failure (ARF)—also referred to as acute kidney injury—is defined as a rapid deterioration in renal function that results in the accumulation of metabolic waste in the body. It is characterized by an impaired regulation of water and solute balances, and may be due to prerenal, postrenal, and/or primary renal causes. Prerenal azotemia reflects a reduced glomerular filtration rate (GFR), which is a consequence of renal hypoperfusion; it is not the result of structural renal damage. Immediate restoration of renal blood flow will reverse the azotemia over a period of time; however, if the hypoperfusion is severe or prolonged, or if there is prior renal dysfunction, acute primary renal failure due to ischemic acute tubular necrosis will be induced. Postrenal azotemia occurs when urine flow is obstructed or the excretory pathway is ruptured and there is subsequent urine resorption. Persistent urinary obstruction may cause irreversible renal damage. Early detection of postrenal azotemia will result in complete restoration of renal function. Acute tubular necrosis accounts for the majority of acute primary renal failure cases and is characterized by an abrupt and sustained reduction in GFR due to an ischemic or toxic renal insult. The conditions that incite ischemia are the same as those for prerenal azotemia; however, the duration of the ischemia is important. Nephrotoxins are a frequent cause of tubular necrosis. The high rates of blood flow and metabolic activity in the kidneys as well as their excretory function predispose dogs and cats to the toxic effects of drugs as well as endogenous or exogenous toxins.

Clinical Signs: The clinical course in acute tubular necrosis can be divided into three phases: an initiating phase, a maintenance phase, and a recovery phase. The initiating phase, which is marked by the onset of renal injury, is the period in which there is the greatest potential for preventing or reversing tubular damage and the progression to overt renal failure because it is during this period that renal cell damage develops. The challenge, however, is that the initiating phase may only become evident in retrospect as it generally lacks characteristic signs. The maintenance phase is characterized by the onset of oliguria (i.e., urine production is less than 1ml/kg/hour). The onset of this phase typically occurs during the first 24 hours, but may be delayed for up to 1 week. The duration of this phase is highly variable, but usually persists for up to 2 weeks. It is characterized by: fluid and electrolyte imbalances, including an alteration in hydration; hyponatremia; hyperkalemia; high anion gap metabolic acidosis; hypocalcemia; hyperphosphatemia; and azotemia. Clinical signs include gastrointestinal, hematological, and neurological manifestations of renal failure. The recovery phase commences when the GFR increases, which consequently slows down and reverses the azotemia. There is a progressive increase in urine volume, and although the tubular function begins to improve, it nevertheless remains impaired. Diuresis persists because of the diminished ability of the tubules to reabsorb sodium and respond to vasopressin. Clinical manifestations observed in the maintenance phase persist into the recovery phase. In some patients, infections and/or gastrointestinal bleeding may occur. Sites of infection include the respiratory tract, operative sites, and the urinary tract. Septicemia may also occur and is sometimes the result of intravenous and urinary indwelling catheters.

Diagnostics: Extraurinary disorders that produce prerenal azotemia are associated with concentrated, hypersthenuric urine, which contains a relatively low concentration of sodium and high concentration of creatinine. ARF is typically characterized by enlarged or swollen kidneys, elevated hematocrit, and azotemia.

SonoPath.com
1-800-838-4268 info@sonopath.com

PATIENT

Junior Del Carlo

SPECIES

Canine

BREED

Golden Doodle

SEX

Neutered Male

AGE

10 Years

WEIGHT

114 Lbs.

INTERPRETED BY

Eric Lindquist, DMV DABVP, Cert. IVUSS

IMAGING PERFORMED BY

Debbie White, DVM

HOSPITAL NAME

Lone Mtn. AH

REFERRING VET

Debbie White, DVM

INVOICE

13195

DATE

12/28/21

Urine is isosthenuric or minimally concentrated, and contains high concentrations of creatinine. Proteinuria or glycosuria may also accompany this condition. The sediment will show casts and RTE cells. Complete anuria is usually associated with postrenal azotemia. Features that are typical for acute tubular necrosis include: anuria in the absence of a urinary tract obstruction or rupture; severe proteinuria; significant hematuria with red cell casts; and prolonged oliguria. In these cases, a diagnostic renal biopsy is indicated.

Treatment: Most patients with ARF are volume depleted. Fluid therapy is indicated to correct dehydration, which will restore adequate renal perfusion and may prevent further renal damage. If the etiology was prerenal in origin, then urine volume will increase. In the maintenance phase, fluid therapy should be directed toward maintaining fluid balance and preventing both overhydration and dehydration. In cases of renal disease it is important that only maintenance needs and ongoing losses are attended to as overhydration can develop if there is reduced renal function. Insensible losses are calculated at 20 ml/kg/day. Aggressive fluid therapy during the recovery phase may perpetuate polyuria. As the urine volume stabilizes, the volume of fluid administered should be reduced correspondingly. Because dehydration may occur during this phase, one should monitor body weight and clinically assess the hydration status as fluid therapy is being reduced. Oliguric patients who are unresponsive to fluid volume replacement can be treated with mannitol, furosemide, and/or dopamine in an attempt to increase GFR and urine volume. Hyperkalemia is commonly associated with the maintenance phase of ARF. Concentrations greater than 6 mmol/l may require treatment with sodium bicarbonate, dextrose, insulin and/or calcium gluconate. Hemodialysis should be considered in patients with severe, persistent uremia, acidosis, or hyperkalemia. It may also be used to treat overhydration and hasten the elimination of nephrotoxins.

Conclusion: Because ARF is frequently iatrogenic and associated with nephrotoxic drugs or inadequate fluid therapy, prevention is the best therapy.

References:

Acierno MJ, Maeckelbergh V. Continuous renal replacement therapy. *Compend Contin Educ Vet* 2008;30:264-72.

Grauer GF. Early detection of renal damage and disease in dogs and cats. *Vet Clin North Am Small Anim Pract* 2005;35:581-96.

Labato MA. Strategies for management of acute renal failure. *Vet Clin North Am Small Anim Pract* 2001;31:1265-87.

Ross L. Acute kidney injury in dogs and cats. *Vet Clin North Am Small Anim Pract* 2011;41:1-14.