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Acute on Chronic Kidney Disease in a Non-Descript Bitch

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Abstract

A nine-year-old female mongrel dog was presented to Veterinary Clinical Complex, College of Veterinary Science, Proddatur with history of acute onset of anorexia, vomiting and tarry colored diarrhea. Upon clinical examination, subnormal rectal temperature, blanched conjunctival mucous membranes and moderate dehydration were observed. Auscultation of thorax revealed the presence of grade III systolic murmurs. Anemia, leukocytosis, azotemia, hypoproteinemia and hypoalbuminemia were also observed. Renal vascular doppler showed an increased renal resistive index (RRI) and pulsatility index (PI). Transthoracic echocardiography revealed hyperkinetic left ventricle with concentric hypertrophy. Based on the above findings, the case was diagnosed as Acute on Chronic Kidney Disease (ACKD) with secondary Hypertrophic Cardiomyopathy (HCM). The patient was treated with antibiotic, ACE inhibitor and supplements.

Keywords: ACKD, anemia, HCM, resistive index

Introduction

Acute on chronic kidney disease (ACKD) is often reported in dogs with CKD, resulting from a sudden decrease of glomerular filtration rate (Cowgill and Francey, 2012; IRIS, 2023). In dogs with stable CKD additional renal insult like ischemia, toxin injury, NSAID therapy, or infections precipitate this sudden decline in GFR, resulting in severe metabolic and systemic derangements leading to ACKD. This report describes clinical, haemato-biochemical, ultrasonographic, echocardiographic changes in a nine-year-old mongrel diagnosed with Acute on chronic kidney disease (ACKD) and secondary hypertrophic cardiomyopathy (HCM).

Case History and Observation

A nine-year-old female mongrel was presented to College of Veterinary Science, Proddatur with history of acute onset of anorexia, vomiting and, foul smelling tarry colored diarrhea. On physical examination, the dog was obtunded and recumbent. Clinical examination revealed subnormal temperature (96.9°F) with prolonged skin tenting time and pale mucous membranes. Cardiac auscultation revealed grade III systolic murmur on left apical region while lung auscultation was unremarkable. Haematological parameters revealed severe anemia (Hb – 3.4 g/dl, PCV 11.4%, RBC-1.5 mill/cmm) along with neutrophilic leukocytosis (TLC- 24,700/cmm). Serum biochemical analysis showed a marked elevation in serum creatinine (24.3 mg/dl) and BUN (159.1 mg/dl). Concurrent hypoproteinemia (4.67 g/dL) and hypoalbuminemia (1.72 g/dL) were also observed, collectively indicating the presence of primary renal disease. Abdominal ultrasound revealed increased cortical echogenicity of both kidneys with an indistinct corticomedullary junction in right kidney (Fig.1). Reduced kidney-aorta ratios (LK:Ao – 5.81 and RK:Ao – 5.4), increased renal resistive index (0.83 in left kidney and 0.88 in right kidney) (Fig.2) were recorded. Echocardiographic examination recorded a hyperkinetic left ventricle with thickened left ventricular free wall (LVFWs- 24mm, LVFWd- 13mm) (Fig.3) and stage III diastolic dysfunction with E/A ratio of 2.20 and E/Elat – 17.10 (Fig.4).

Treatment and Discussion

Based on the above findings, the case was diagnosed as ACKD with secondary HCM. The patient was treated with amoxicillin sulbactum combination (@ 10mg/kg b.wt I/M BID),, benazeperil (@0.25mg/kg p/o BID), syrup UTKID (@5-10ml p/o bid), syrup aRBC pet (@5-10ml p/o bid) with weekly darbopoeitin (@0.8mcg/kg SQ). Acute on chronic kidney disease is characterized by acute deterioration of renal function superimposed on a chronic kidney disease. The clinical presentation and laboratory abnormalities of ACKD

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may resemble those of AKI, which occasionally makes differentiation between AKI and ACKD challenging (Dunaevich *et al.,*2020). The exhibited clinical signs like anorexia, vomiting, melena, lethargy, dehydration, and recumbency, are commonly associated with advanced renal dysfunction and uremic syndrome. Similar nonspecific gastrointestinal and systemic manifestations have been previously described in dogs and cats affected with ACKD (Dunaevich *et al*., 2020; Ross, 2011). In addition to decline in erythropoietin levels, uremic toxins and G.I hemorrhage secondary to uremic gastritis contributed to severe anemia recorded in this case. Similar mechanisms contributing to anemia in advanced renal disease have been reported previously by Polzin (2013). Concurrent hypoproteinemia and hypoalbuminemia observed in the present case are attributed to protein-losing nephropathy associated with glomerular injury, reduced nutritional intake, chronic inflammation, and possible gastrointestinal protein loss. Ultrasonographic findings including increased renal cortical echogenicity, reduced kidney-to-aorta ratio, and poor corticomedullary distinction were suggestive of chronic renal parenchymal degeneration and fibrosis. Increased RRI is considered indicative of elevated intrarenal vascular resistance and reduced renal perfusion associated with chronic renal parenchymal disease ((Rivers *et al*., 1997; Pouchelon *et al*.,2015). Another important finding is the secondary HCM and stage III diastolic dysfunction evidence through increased E/A ratio and E/E$_{lat}$ which emphasizes the relation between renal disease and cardiovascular changes (Brown *et al*., 2007; Pouchelon *et al.*, 2015). Chronic activation of RAAS and blood pressure contributes to increased left ventricular afterload leading to concentric left ventricular hypertrophy and diastolic dysfunction. Early recognition of this alteration in cardiac function is vital in management of renal disease as a bidirectional relation exists where renal disease contributes to cardiac disease which inturn compromise renal perfusion and function.

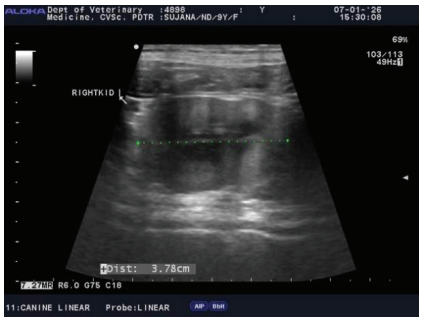

Figure 1 : Transabdominal ultrasound of right kidney

Figure 2: Elevated Renal resistive index (RRI) of 0.83 increased cortical echogenicity

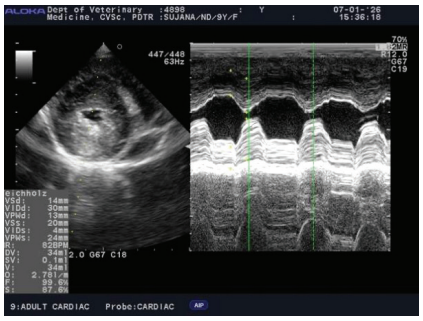

Figure 3 : Rt.Parasternal short axis view: Thickened LV free wall

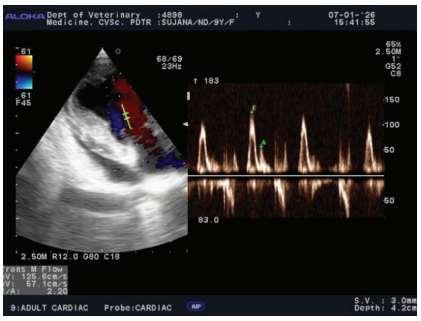

Figure 4: Trans mitral flow velocities measured in Left parasternal apical 4C view narrowed LV lumen

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