

Chronic Renocardiac Syndrome in a Non-descript dog- A case report

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Abstract

Ten old male mongrel dog weighing 18 kg was presented in recumbency to Veterinary Clinical Complex of NTR College of Veterinary Science, Gannavaram, with a history of anorexia, polyuria, polydipsia and halitosis. It was evident from the history that the dog was diagnosed to be having kidney dysfunction four months earlier and the owner had discontinued the medication. Clinical examination revealed subnormal temperature, pallor mucous membrane and tachycardia. Haemato-biochemical examination revealed anaemia, elevated creatinine, BUN, potassium and phosphorus levels indicating chronic kidney disease. ECG revealed tachycardia and spiked T waves. Ultrasonographic examination revealed shrunken kidneys, while echocardiography showed left ventricular hypertrophy and thickening of interventricular septum. Based on the diagnostic investigation, the case was diagnosed as chronic renocardiac syndrome. Therapy was initiated with fluid therapy, antibiotics, antiemetics, ACE inhibitors, diuretics, proton pump inhibitors and supportive therapy.

Keywords: Chronic renocardiac syndrome, Cardiorenal syndrome, chronic kidney disease, cardiovascular disease

Introduction

Chronic Renocardiac Syndrome (CRS) is characterized by the intricate interplay between chronic kidney disease (CKD) and cardiovascular disease (CVD). The pathophysiology of CRS involves various mechanisms including neurohormonal activation, inflammation, oxidative stress, and endothelial dysfunction. For instance, chronic kidney disease can activate the renin-angiotensin-aldosterone system (RAAS), resulting in hypertension and increased cardiac workload, which may lead to left ventricular hypertrophy and heart failure (Quiroga *et al.*, 2023). Similarly, heart failure can reduce renal perfusion and increase venous pressure, worsening kidney function (Rangaswami *et al.*, 2019). A case of chronic renocardiac syndrome in a non-descript dogs is presented in this article.

Case History and Observations

A 10 yr old male mongrel dog weighing about 18 kg was presented in recumbency to Veterinary Clinical Complex, NTR College of Veterinary Science, Gannavaram, with the history of anorexia, vomiting, polyuria, polydipsia and halitosis. Dog was diagnosed with kidney dysfunction four months earlier and the owner had discontinued the medication. Clinical examination revealed subnormal temperature (97°F), pallor mucous membranes and tachycardia. Anaemia along with mild leucocytosis and neutrophilia were noticed on

haematological examination. Elevated creatinine, BUN, potassium and phosphorus levels were suggestive of CKD. ECG revealed tachycardia (144 bpm) and spiked T waves. Nephrosonography revealed shrunken kidneys with an indistinct corticomedullary junction. Thickening of interventricular septum and left ventricular hypertrophy were noticed in echocardiography. Blood smear examination was negative for haemoprotozoans and rickettsial diseases.

Table 1. Haematological profile

Parameter	Result
Haemoglobin (g/dL)	6.8
Packed cell volume (%)	21
Total erythrocyte count ($\times 10^6/\text{mm}^3$)	3.89
Total leucocyte count ($\times 10^3/\text{mm}^3$)	18.2
Platelet count ($\times 10^3/\mu\text{l}$)	216
Differential leucocyte count (%)	
Neutrophils (%)	77
Lymphocytes (%)	18
Monocytes (%)	2
Eosinophils (%)	3

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Table 2. Serum biochemical profile

Parameter	Result
Total bilirubin (mg/dL)	0.4
ALT (IU/L)	35
AST (IU/L)	43
Total protein (g/dL)	6.5
Albumin (g/dL)	2.35
Globulin (g/dL)	4.15
Creatinine (mg/dL)	29.2
BUN (mg/dL)	124
Calcium (mg/dL)	10.4
Phosphorus (mg/dL)	25
Sodium(mEq/L)	145
Potassium(mEq/L)	6.6



Figure 1. Electrocardiogram showing tachycardia and inverted tall spiked T waves (Lead II, Paper speed=50mm, 1cm=1mv)



Figure 2. Echocardiography showing left ventricular hypertrophy and reduced chamber size

Discussion

Haematological examination revealed significant abnormalities including reduced PCV (21%),

haemoglobin (6.8g/dL) and total erythrocyte count ($3.89 \times 10^6/\text{mm}^3$), suggesting non regenerative anaemia. Additionally, there was mild leucocytosis with mild neutrophilia (Table 1). Serum biochemical tests revealed elevated levels of creatinine (29.2 mg/dL) and blood urea nitrogen (124 mg/dL), indicating that the animal is in stage IV CKD according to the IRIS classification (IRIS, 2023). Similar findings were reported by Orvalho and Cowgill (2017), who opined that anemia might be due to reduced production of erythropoietin in CKD. The increased levels of potassium and phosphorus suggest impaired kidney function, since the kidneys are responsible for excreting these electrolytes (Brunetto *et al.*, 2023). The serum calcium-phosphorus (sCaPP) product was assessed for prediction of survival of the dog and was found to be $260 \text{ mg}^2/\text{dL}^2$, significantly exceeding the threshold value of $70 \text{ mg}^2/\text{dL}^2$ used to predict survival in canine CKD, thereby indicating a poor prognosis (Lucero *et al.*, 2019).

Electrocardiography characterized by inverted tall T waves was in accordance with Teymouri *et al.* (2022), who stated that up to nine per cent of patients suffering from chronic kidney disease (CKD) might be affected with hyperkalemia (5.5 mEq/L or more) which could eventually lead to arrhythmias and sudden death. The shrunk appearance of kidneys with indistinct corticomedullary junctions and irregular contour on ultrasonography is consistent with chronic kidney disease, where the kidneys lose their normal size and structure due to fibrosis and scarring (Perondi *et al.*, 2020). Echocardiographic assessment showed tachycardia and left ventricular hypertrophy, a common cardiac manifestation in chronic kidney disease due to systemic hypertension or increased cardiac workload. This finding was in agreement with Orvalho and Cowgill (2017).

Based on the diagnostic investigation, the case was diagnosed as Type IV cardiorenal syndrome, also known as chronic renocardiac syndrome (CKD complicated with hypertrophic cardiomyopathy). Therapy was initiated with Ringer's lactate (10 ml/kg IV, BID), 0.9% NS (10 ml/kg IV, BID), amoxicillin-sulbactam (20 mg/kg IV, BID), ondansetron (0.5 mg/kg IV, TID), enalapril (0.5 mg/kg PO, BID), furosemide (3 mg/kg PO, BID) and sevelamer (1 tablet PO, daily). The dog exhibited mild clinical improvement after therapy. But unfortunately, the patient succumbed to its illness a week later, reflecting the advanced stage of the disease at the time of presentation.

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