Case study

Ehrlichia canis Infection Induced Chronic Kidney Disease in a Labrador Retriever and its Management - A Case Report

ABSTRACT:

Introduction:

Chronic kidney disease is irreversible, progressive and most common form of kidney disease in dogs. Canine ehrlichiosis is caused by Gram negative intracellular bacteria *Ehrlichia canis*.

Case Presentation:

A 7-year old Labrador retriever male dog weighing around 35 kg was presented to the Madras Veterinary College Teaching Hospital with a history of inappetance, vomiting, polyuria and polydipsia from fifteen days. The dog was fully vaccinated and dewormed. On general clinical examination, all vital parameters were within normal range except elevated temperature (103.8°F). Hematological findings revealed mild thrombocytopenia and hypochromasia. Serum Biochemistry revealed increased creatinine level (3.68 mg/dl). Blood pressure was measured using Doppler device which revealed secondary hypertension. Blood smear examination was found to be negative.

Case Discussion:

Animal was treated for chronic kidney failure. Even then animal was going down and not taking feed. Blood sample was sent for Molecular PCR which confirmed presence of *Ehrlichia canis*. Then animal was treated for Canine Monocytic Ehrlichiosis to control *Ehrlichia canis* induced renal failure. Then there was little progress in condition of the animal. Animal was maintained with renal diet.

Ehrlichia canis (*E.canis*) is most common Rickettsial disease in dogs. The relative risk of CKD for patients exposed to ticks carrying E.canis was found to be 2.12 [1]. Chronic kidney disease occurs due to loss of functional nephrons which leads to poor clearance of creatinine by kidneys thereby increasing creatinine level in serum. Clinical signs such as vomition, anorexia, polyuria, polydipsia, oral ulceration, and weight loss are exhibited. ~~Animal~~ The animal should be treated symptomatically and maintained with a renal diet.

2. PRESENTATION OF CASE

A 7-year old Labrador retriever male dog weighing 35 Kg was presented to Madras Veterinary College Teaching Hospital Critical Care Unit with a history of ~~inappetance~~inappetence, vomiting, polyuria, and polydipsia from 15 days. General Clinical examination revealed heart rate – 76 bpm, respiratory rate –

Comment [D1]: Mention number of dog used

42/min, pulse rate – 72/min, rectal temperature - 103°F, and pale mucous membrane. ~~Blood~~ The bloodsample was collected and sent for hematological and biochemical profile evaluation. Blood gas analysis was done.

3. DIAGNOSIS

~~Hematological~~ The hematologicalprofile revealed mild anemia, thrombocytopenia, and hypochromasia. Serum biochemistry revealed an elevated creatinine level (3.68 mg/dl). Based on the International Renal Interest Society (IRIS), it was graded as CKD stage 3 based on creatinine[2]. Blood pressure was measured using Doppler device which revealed secondary hypertension (180 mm Hg). Arterial blood gas Analysis revealed metabolic acidosis. ~~Blood~~ A bloodsmear was found negative for parasites. The hematology and biochemical profile ~~was~~ analyzed~~analysed~~ and presented in Table 1. The findings of blood gas analysis are presented in Table 2.

Table 1: Hemato- biochemical analysis of *E.canis*~~infection induced~~infection-induced CKD before and after treatment.

Parameter	Reference range	Day 0	Day 10	Day 20	Day 30
Hemoglobin (g/dl)	12-18	7.1	6.4	8.4	9.2
PCV (%)	37-55	21.4	19.5	25.2	28.6
RBC	5.5-8.5	3.64	3.28	4.2	4.73
WBC ($x10^3/\mu L$)	6000-17000	12400	13000	6400	7600
Neutrophils (%)	58-85	74	74	70	71
Lymphocytes (%)	8-21	20	16	22	24
Platelet ($x10^3/\mu L$)	1,75,000 – 5,00,000	1,23,000	1,15,000	1,95,000	1,88,000
BUN (mg/dl)	10-28	50.73	30.32	106.8	107.26
Creatinine(mg/dl)	0.5-1.5	3.68	3.94	9.54	9.1
Calcium (mg/dl)	9-11.3	12.64	8.43	17.53	9.27
Phosphorus (mg/dl)	2.6-6.2	8.98	7.03	14.52	12.83
ALP (U/L)	20-156	61.0	108	385	173.6
ALT (U/L)	21-102	19	1417	-	284
GGT (U/L)		-	21	30	
Total protein (g/dl)	5.4-7.1	6.9	8.4	8.2	8.9
Albumin (g/dl)	2.3-3.8	2	1.8	2.4	2.6
Glucose (mg/dl)		71	56	92	81
Cholesterol (mg/dl)	135-270	-	166	107	129

Comment [D2]: Please insert number as mean±SE

Table 2: Blood gas parameters and UP: UC of *E.canis* induced CKD

Parameter	Reference range	Day 10
pH	7.31-7.42	7.25
pCO_2 (mmHg)	35.0-48.0	17.9
HCO_3 (mmol/L)	21.0-28.0	12.0
pO_2 (mmHg)	85-95	106.9
SO_2 (%)	94.0-98.0	98.5
BUN/Crea (mg/mg)	12-20	5.7
Urea/Crea (mmol/mmol)	48.5-80.8	23.2

4. TREATMENT AND MANAGEMENT

~~Animal~~ The animalwas initially treated for chronic kidney disease symptomatically. Inj. Ringer's Lactate (350 ml, I/V), Inj. Pantaprazole (35 mg, I/V), Inj. Ondansetron (7mg, I/V), Inj. Darbopoietin (40 IU, S/C) was given. Tab. Renodyl (1-0-0), Tab. Enalapril @ dose rate of 2.5mg/kg, Powder. Phosclear (1-0-1) was prescribed for 10 days. Even then animal condition was not improved. The blood sample was collected again and sent for molecular PCR which revealed presence of *E.canis* [3]. Then animal was treated with triple therapy – Doxycycline (10mg/kg, I/V), Clindamycin (12mg/Kg, I/V), Metronidazole (15mg/Kg, I/V). A single shot of Imidocarb at the dose rate of 6.6mg/Kg was given. Owner was advised to maintain the animal with renal diet.

5. CASE DISCUSSION

Arterial blood gas (ABG) is an essential part of diagnosing and managing the oxygenation status and acid–base balance of the high-risk patients, as well as in the care of critically ill patients in the Intensive Care Unit [4]. Animal was treated with fluid therapy to correct the metabolic acidosis. CKD leads to hyperphosphatemia and hypocalcemia. Hence phosphate binder was given to reduce to level of phosphate in blood [5]. After the initiation of triple therapy, there was improvement in the condition of the animal. Increase in hemoglobin level (Fig. 1) and platelet count (Fig. 2) was observed. The creatinine level was increased after the treatment as a result of permanent damage of kidney caused by *E.canis* (Fig. 3). Once the animal's appetite became normal, it was maintained with renal diet to maintain the quality of life.

Fig 1. This graph shows increase in Hemoglobin as the treatment progress

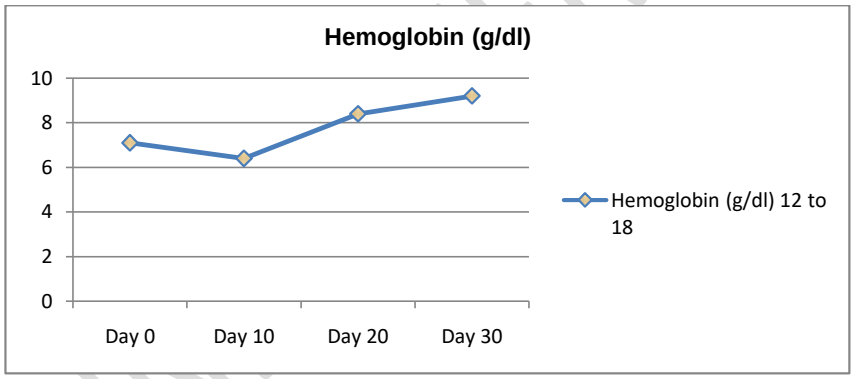


Fig 2. This graph shows increase in platelet count in response to treatment

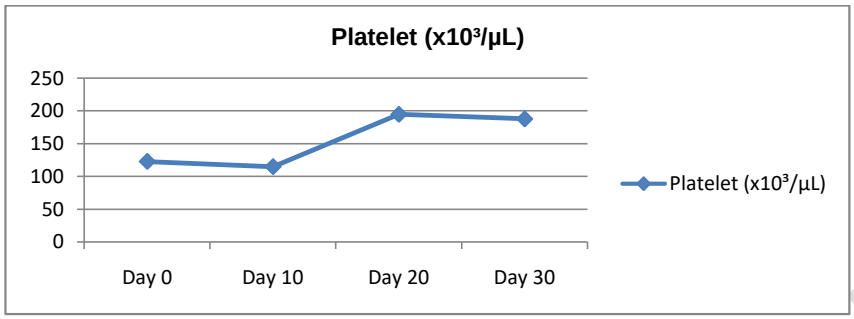
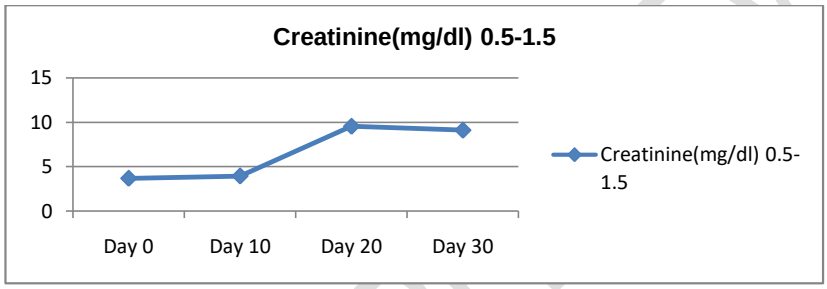


Fig 3. This graph shows increase in Creatinine level as a result of permanent damage of Kidney caused *E.canis*



6. CONCLUSION

Chronic kidney disease (CKD) is most common form of kidney disease in dogs which causes permanent reduction in number of functional nephrons. It has varied etiology. It is suggested that glomerular disease accounts for 50% of the CKD in dogs. The coincidence effect of ehrlichiosis on chronic kidney disease is unclear. Ehrlichiosis leads to protein-losing nephropathy as a result of immune-complex glomerulonephritis thereby leading to renal failure [6]. Conservative medical management is the only realistic option for most dogs with CKD. It consists of supportive and symptomatic therapy designed to ameliorate clinical signs, correct fluid deficits or excess as well as electrolyte, acid-base, endocrine and nutritional balance.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

REFERENCES

1.Burton, Wade, Corie Drake, Jennifer Ogeer, Jesse Buch, Rebekah Mack, Donald McCrann, and Michael Joseph Coyne. “Association between exposure to Ehrlichia spp. And risk of developing chronic kidney disease in dogs.” Journal of the American Animal Hospital Association 56, no. 3 (2020): 159-164.

2. IRIS. International Renal Interest Society (IRIS). Available at: http://www.iris-kidney.com/index.shtml. Novartis Animal Health Inc.; 2007. Accessed March 8, 2012.

3. Nazari, Mojgan, Sue Yee Lim, Mahira Watanabe, Reuben SK Sharma, Nadzariah ABY Cheng, and Malaika Watanabe. “Molecular detection of Ehrlichia canis in dogs in Malaysia.” PLoS neglected tropical diseases 7, no. 1 (2013): e1982.

4. Sood, Pramod, Gunchan Paul, and Sandeep Puri. “Interpretation of arterial blood gas.” Indian journal of critical care medicine: peer-reviewed, official publication of Indian Society of Critical Care Medicine 14, no. 2 (2010): 57.

5. McGrotty, Yvonne. “Diagnosis and management of chronic kidney disease in dogs and cats.” In practice 30, no. 9 (2008): 502-507.

6. Mann, Sahiba, S. K. Uppal, S. A. Hussain, and L. D. Singla. “Diagnosis and management of Ehrlichia canis associated chronic kidney disease (CKD) in three Labrador dogs.” SKUAST Journal of Research 19, no. 1 (2017): 160-163.