Indian J. Vet. Med. Vol. 41, No. 2, 2021 pp. 87-90

Successful medical management of a critical case of hypoadrenocorticism (Addison's disease) in an adult female dog

*Sabita Rakshit[1], Dale Clark[1], Kabita Roy[2]*and I.C. Datta[2]*

[1]Milford Veterinary Clinic (MVC),110 Canal Street, Milford, MI-48381, USA,[2] College of Veterinary Science & Animal Husbandry, Nanaji Deshmukh Veterinary Science University,Jabalpur-482001, MP, India

Abstract

Phoebe Garner, a 5 year 9 months old spayed female Yorkshire mix-breed dog was presented to the Milford Veterinary Clinic on March 13, 2019 with a history of recently observed postural defects, staggered gait, and seizures, raising serious doubt about possible Addisonian crisis. On March 12, 2019, the client took the patient to the nearby emergency veterinary care (MEDVET) for overnight medical support. Hemoconcentration, severe hypoglycemia, azotemia, and electrolyte imbalance were detected, the patient stabilized and returned to the home clinic (MVC) for further diagnostics and treatment. The dog is now out of danger with long-term mineralocorticoid-glucocorticoid therapy.

Key words: Addisonian crisis, seizures, supportive therapy

Steroid hormones: aldosterone, the most important mineralocorticoid, and cortisol the primary glucocorticoidare synthesized *in vivo* from cholesterol. Aldosterone helps to maintain electrolytes (Na^+, K^+) and water homeostasis. Cortisol, involved in the maintenance of blood pressure and blood volume, enhances vascular sensitivity to the catecholamines. It also contributes to maintenance of vascular wall muscle tonicity, permeability, and endothelial integrity (Ganong, 2003). In the fasting animal, cortisol helps to preserve normal circulatory glucose level by promoting lipolysis in the depot fat and hepatic gluconeogenesis (Guyton and Hall, 2000; Kemppainen and Behrend, 1997). Cortisol also suppresses the inflammatory response and counteracts stress (Ganong, 2003).The clinical syndrome is often the consequence of immune-mediated massive (85-90%) destruction of the adrenocortical parenchyma (Klein and Peterson, 2010).

Dogs with primary hypoadrenocorticism (Addison's disease), mostly young females (Lathan and Thompson, 2018), may be presented in multiple pathoclinical states ranging from ill-defined waxing and waning clinical signs to acute hypovolemic collapse. In the most common clinical presentation, dog patients exhibit signs of both mineralocorticoid and glucocorticoid deficiency: electrolyte imbalance and hypoglycemia. The etiology may be multi-factorial; most commonly, immune-mediated massive destruction of adrenal cortex tissue, drug-induced 'iatrogenic'adrenocortical necrobiosis (Mitotane®), enzyme inhibition (Trilostane®), and infiltrative neoplastic, or mycotic diseases (Lathan and Thompson, 2018). In acute presentation, corroborated by the ACTH stimulation test, the topmost priority is correction of hypovolemia, hyperkalemia, metabolic acidosis and hypoglycemia. Appropriate IV fluid therapy addresses most of the pathoclinical issues. Life-long glucocorticoid replacement (Prednisone, injectable) is recommended with concurrent mineralocorticoid (Deoxycorticosterone pivalate DOCP, oral) in most patients. The prognosis is highly favourable. However, delayed diagnosis and treatment may result in fatality.

Case History and Observations

The well-informed owner had taken Phoebe Garner, 5 years 9 months old female spayed Yorkshire

Fig. 1. Phoebe Garner - at follow-up visit

*Corresponding author: kabitaroy59@yahoo.in

Diagnostics

Table 1. Phoebe's hemogram: March 12, 2019 (MEDVET).

Parameter (Units)	Value	Range	Status
TEC (1x 10^6/µL)	9.76	5.65-8.87	H
Hematocrit (%)	59.6	37.3-61.7	H
Hemoglobin (g/dL)	21.4	13.1-20.5	H
MCV (fL)	61.1	61.6-73.6	L
MCH (pg)	21.9	21.2-25.9	N
MCHC (g/dL)	35.3	32-37.9	N
Reticulocyte (1x10^3/µL)	14.6	10-110	N
TLC (1x10^3/µL)	9.71	5.05-10.70	N
Neutrophil (1x10^3/µL)	3.37	2.95-11.64	N
Lymphocyte (1x10^3/µL)	5.13	1.05-5.10	H
Monocyte (1x10^3/µL)	0.62	0.16-1.12	N
Eosinophil (1x10^3/µL)	0.53	0.06-1.23	N
Thrombocyte (1x10^3/µL)	4,03	148-464	N
CBC Autoanalyzer			

Table 2. Phoebe's blood chemistry: March 12, 2019

Parameter (Units)	**Value**	**Range**	**Status**
Glucose (g/dL)	18	74-143	L
Creatinine (mg/dL)	0.5	0.5-1.8	N
BUN (mg/dL)	44	7-27	H
Phosphate (mg/dL)	4.9	2.5-6.8	N
Total calcium (mg/dL)	9.8	7.9-12.0	N
Total protein (g/dL)	7.2	5.2-8.2	N
Albumin (g/dL)	3.3	2.3-4.0	N
Globulin (g/dL)	3.9	2.5-4.5	N
A/G ratio	0.8		
ALT (U/L)	126	10-125	H
Lipase (U/L)	2471	200-1800	H
Total bilirubin (mg/dL)	0.4	0-0.9	N
Cholesterol (mg/dL)	73	110-320	L
Na+ (mmol/L)	147	144-150	N
K+ (mmol/L)	6.5	3.5-5.8	H
Cl- (mmol/L)	108	109-122	L
NH_3 (µmol/L) 8.44 PM	119	0-98	H
Blood Chemistry Autoanalyzer			

Table 3. Phoebe's endocrine status (IDEXX Lab).

Test	**Value**
Pre-ACTH stimulation cortisol titer (µg/ dL)	<0.2
Post-ACTH stimulation cortisol titer (µg/ dL) <2.0 µg/ dL titer post-ACTH: Addisonian state	<0.2

mix-breed dog, weight 5.7 kg, with subnormal temperature (94.4°F) to MEDVET 7x24 emergency facility for overnight medical care/ life support in the evening of March 12, 2019. The pet was presented to the home clinic MVC in the morning of March 13, 2019 for further treatment. Anamnesis revealed the history of postural defects: not moving properly, bouts of seizures, not eating well over the last week and off-feed now, no medicines in the past, and foreign body ingestion. This raised suspicions on Addison's disease, known as the 'great pretender because of close similarity to some common diseases.

Treatment Schedule

I. MEDVET Emergency Care

12th March, 2019: Phoebe's CBC: hemoconcentration, microcytosis, lymphocytosis; blood chemistry panel: hypoglycemia, elevated BUN, hypochloremia, and azotemia. To control severe hypoglycemia 5 ml 50% glucose, diluted with 15 ml normal saline solution administered IV. 8.30 PM: based on in-house blood work (code istat chem 8) report infusion of sterile normal saline solution+ 2.5% dextrose infused IV @ 10 ml/hr. with advisory to switch over to plain normal saline solution, if the blood glucose level exceeded 200 mg/dL limit in the 11 PM blood chemistry panel. Pantoprazole sodium generic 0.6 ml [4mg/ml],total 2.4mg OD slow IV drip, and anti-emetic Cerenia® (Zoetis US, Inc.) 0.24 ml [10 mg/ml], total 2.4 mg OD given IV, both finishing at 11 PM. Anti-ulcer generic Sucralfate 0.25 g, dissolved in 5 ml distilled water was given OD in empty stomach at 7 AM. 13th March, 2019. Monitoring: BP at 4 hr. intervals, the vital clinical parameters every hr. until normal, then at 4 hr. intervals, heart support SOS, walk the dog protocol at 6 hr. intervals, and drinking water *ad lib*. Seizures: if observed and blood glucose drops < 60 mg/dL, dextrose-saline (50% dextrose + 15 ml normal saline solution) as slow IV drip. If normothermic, bland diet at 7 AM, repeat the blood chemistry panel, and Dexamethasone sodium phosphate (Dex SP) generic 0.12 ml [4 mg/ ml] BID at 8AM (13.03.2019).

Clinical response updates: March 12, 2019, 11 PM BAR, temperature improved, strong femoral pulse pattern, BP 95 mm-mercury, blood chemistry profile: temporary hyperglycemia (228mg/dL, range 60-115 mg/dL). BUN level reduced (44→32mg/dL, range 10-26 mg/dL), water-cum-electrolytes balance restored: hyponatremia/ hyperkalemia and hypochloremia resolved, and hemoconcentration abolished: Hb concentration and hematocrit % near normal. March 13, 2019 MEDVET 1 AM: Blood glucose 118 mg/dL (normal), BP 11 mm-mercury (normal). 7 AM Phoebe ate some chicken, blood chemistry panel: BUN, glucose and potassium normal values, but moderate hyponatremia/ hypochloremia noticed. Client instructions: Phoebe has improved with the emergency care treatment, and as such the pet's discharge to the owner's custody scheduled at 9 AM March 13, 2019 to be taken to the home clinic, MVC for continued healthcare support.

II. Milford Veterinary Clinic

March 13, 2019 10.30 AM. Physical examination: temperature 100.0°F, HR 120/ minute, RR 32/ minute, CRT < 2 seconds, visible mucous membranes dark pink. On discharge in the evening home subcut fluid therapy with detailed advisory is recommended. March 14, 2019 MVC: Results of the ACTH stimulation test (IDEXX) corroborated Addison's disease. Next day called on the owner for patient's update. The dog is much improved, and is eating well.

Phoebe is now doing much better with a feeling of wellness. March 18, 2019: Elicited the patient's clinical update from the owner. The pet is eating normally, and her behavioral profile is improved perceptibly (Fig. 1.).

Monitoring the serum electrolytes (mmol/L) profile: Physiological range Na+ 144-160, K+ 3.5-5.8, Cl- 109-122. Phoebe's status: March 29, 2019: Na+ 158, K+4.2, Cl-119. April 6, 2019: Na+ 154, K+ 3.4, Cl- 121. April 11, 2019: Na+ 150, K+ 5.1, Cl- 122. Thus, the electrolytes are well-stabilized, and Phoebe is clinically normalized. DOCP (desoxycorticosterone–pivalate) (Percorten-V®, Novartis Animal Health US, Inc.) 0.2 ml, injected IM with the next dose scheduled after 28 days interval. Prednisone oral medication is being given by the owner at home daily.

Phoebe's case is typical canine hypoadrenocorticism (named Addison's disease in humans) crisis, mandating continuous life-support medications with judicious modifications on periodic assessment of clinico-hemato-biochemical response. In the context of crisis management, the owner's timely action: admission of the patient in the veterinary emergency center was crucial. Symptoms of lethargy, anorexia, weight loss, tremors/ shaking, muscle weakness, hypothermia

are consistent with the earlier reports (Ten *et al*., 2001; Zhernakova *et al*., 2013). Initially, hypoglycemia could be confused with seizures. Hyponatremia with concurrent hyperkalemia, in the instant case, resulted in pre-renal azotemia and hypovolemic shock. No cardiac arrhythmias were recorded in the cardiologist's report, presumably because of mild transient hyperkalemia. Apart from the clinical pathology, ECG and imaging protocol, the major diagnostic criterion was abnormally low post-ACTH stimulation cortisol titer (<0.2 µg/ dL, Table 3). The renal function remained unimpaired, and the hepatic function was also not compromised.

Long-term mineralocorticoid replacement therapy with monthly DOCP injection in the clinic, and daily oral glucocorticoid (Prednisone) administration by the owner is scheduled with detailed advisory to avoid stress and offer plenty of fresh drinking water (Zhernakova *et al*., 2013). With the well-informed owner's optimized homecare, the prognosis is highly favourable in relation to longevity, commensurate with the companion dog's improved quality of life.

References

Ganong, W.F. 2003. *Review of Medical Physiology*, 21st edn. Lange Medical Books, New York, USA, pp. 359-84.

Guyton, A.C. and Hall, J.E. 2000. *Textbook of Medical Physiology*, 10th edn. W.B. Saunders, St. Louis, Missouri, USA, pp. 339-84.

Kemppainen, R.J. and Behrend, E. 1997. Adrenal physiology. *Vet. Clin. North Am. Small Anim. Pract*., **27**: 173-86.doi: 10.1016/s0195-5616(97)50026-x

Klein, S.C. and Peterson, M.E. 2010. Canine hypoadrenocorticism. Part I. *Can. Vet. J.*, **51**: 63-69.

Lathan, P. and Thompson, A.L. 2018. Management of hypoadrenocorticism (Addison's disease) in dogs. *Vet. Med*., **9**: 1-10.

Ten, S., New, M, and Maclaren, N. 2001. Clinical review 130: Addison's disease 2001. *J. Clin. Endocrinol. Metabol*., **86**: 2909-22.

Zhernakova, A., Withoff, S. and Wijmenga, C. 2013. Clinical implications of shared genetics and pathogenesis in autoimmune diseases. *Nat. Rev. Endocrinol. (Review)*, **9**: 648-59. doi: 10.1038/nrendo.2013.161

Received : 30.03.2021
Accepted : 11.11.2021