

A case of periparturient eclampsia and the consequences in a German-shepherd bitch

Fasanmi, O. G.^{1,2*}, Olaitan-Williams, A. A.³, Nwufoh, O. C.⁴, Obafemi, O. M.⁴,
Ajibola, E. S.⁵ and Okuneye, J. O.²

¹Department of Production Animal studies, Faculty of Veterinary Science, University of Pretoria, South Africa.

²Department of Animal health, Federal College of Animal Health & Production Tech, Ibadan, Nigeria.

³Justice Development and Peace Commission, Ijebu-Ode, Nigeria.

⁴Veterinary Clinic, Federal College of Animal Health and Production Technology, Ibadan, Nigeria.

⁵Department of Physiology and Pharmacology, Faculty of Veterinary Medicine, Federal University of Agriculture, Abeokuta, Nigeria.

*Corresponding author. Email: bumaetal@gmail.com, u15340482@tuks.co.za.

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ABSTRACT: The history of malnutrition and clinical symptoms of high fever, dyspnoea, panting, recumbency, muscular twitching and seizures led to collection of blood samples from a German shepherd bitch on day 60 of gestation at the Veterinary Clinic of Federal College of Animal Health and Production Technology, Ibadan. Symptomatic and supportive therapies administered to the bitch included; milk with glucose to re-energise, copious volume of water for rehydration, diazepam to abolish seizures and stabilize the bitch. The laboratory results showed haematological parameters to be normal, while serum biochemical indices indicated very low serum calcium (5.5 mg/dl), phosphorus (1.8 mg/dl), potassium (2.7 mg/dl), glucose (45.5 mg/dl), total protein (53.5 g/dl) and albumin (23.2 g/dl) when compared with the normal physiological values (10.60 to 11.60 mg/dl, 4.60 to 5.50 mg/dl, 4.46 to 4.94 mg/dl, 86.10 to 104.60 mg/dl, 62.00 to 80.00 g/dl and 30.10 to 42.20 g/dl respectively) of a healthy German shepherd bitch. The post mortem findings were metritis, accumulation of exudates in the lungs and brain. The resultant hypocalcaemia from dietary deficiency of calcium, precipitated seizures, recumbency, dystocia and thereafter loss of puppies and eventually the bitch. It is, therefore, very pertinent to provide adequate and balanced rations for bitches throughout gestation and ensure provision of multivitamins/mineral supplements to compliment the diet in order to maintain optimal health devoid of periparturient eclampsia.

Keywords: Bitch, eclampsia, German shepherd, periparturient.

INTRODUCTION

Eclampsia, also known as puerperal tetany, milk fever or hypocalcaemia; is an acute and life threatening disorder in dogs, characterised by low blood calcium level (Hall, 2015). Eclampsia is a nutritional deficiency disorder, as a result of dietary calcium deficiency and or vitamin D deficiency; or due to under-activity of parathyroid gland responsible for the control of the release of parathormone, which in turn regulates the amount of calcium stored in the bones (Cote, 2011; Akiibinu et al., 2013; Hall, 2015). The

risk factors that usually predispose to this condition include; mating of bitch at first oestrous, small size of breeds, young bitch gravid with large litter size, poor nutrition before and during gestation period and subjecting pregnant bitch to other forms of stressful conditions (Pathan et al., 2011; Spielman, 2015). This may also occur during parturition and may lead to dystocia (Hall, 2015). The symptoms include; restlessness, nervousness, panting, excessive salivation, hyperthermia, tachycardia,

muscular tremors, loco-motor ataxia and convulsion (Ettinger, 1983; Mathew et al., 2014). Thus, the objective of this study is to show that perparturient eclampsia may result from electrolyte imbalance and cause neonatal and maternal mortalities in German shepherd dogs.

CASE REPORT

Case history, Clinical examinations and clinical parameters

A two years old, pregnant German shepherd bitch at its 60th day of gestation and weighing 30 kg was presented to the Veterinary Clinic of Federal College of Animal Health and Production Technology (FCAH&PT), Moor Plantation, Ibadan, Oyo State. The bitch was brought from a kennel in Ibadan which was also accommodating twenty-nine other German shepherd female dogs as at the day of presentation. All dogs are usually placed on a daily diet of noodles/rice with fish. History also showed that the dogs have never been given vitamin/mineral supplements during the developmental stages and gestation period. They were routinely vaccinated, dewormed and given ectoparasitic bath as at when due.

The bitch was presented with general weakness, excessive salivation, dyspnoea, uncontrolled urination, anorexia, polydipsia, muscular twitching, tremor, seizures, convulsion and recumbency. The rectal temperature, pulse and respiratory rates were 42°C, 120/min and 40/min respectively. The differential and tentative diagnoses are poisoning and eclampsia respectively.

Clinical management and outcomes

The pregnant bitch was placed on admission for intensive monitoring due to the poor health state. The bitch was monitored so as not to lose the bitch or pregnancy. Bitch was treated symptomatically as follows; force fed milk with glucose to re-energise her, supplied copious volume of water for rehydration and given diazepam (2 mg/kg) to abolish seizures. Thereafter, the bitch was stable, and consumed the meals provided subsequently.

Blood collection and serology

Immediately after stabilizing the bitch (2 hours' post-arrival), 3 ml of blood sample was collected through the cephalic vein using sterile hypodermic syringe with a 21-gauge needle. The blood was splitted into two labeled sample bottles; with and without ethylene diamine tetraacetic acid; cold packed and immediately taken to a commercial Laboratory at Apata, Ibadan for haematological and serum biochemical evaluation. Serum sample was harvested using centrifugation method at

3,000 rpm for 10 min within 1 hour of collection of the blood sample. The following serum biochemical parameters were evaluated using an automatic analyzer (Shimadzu CL-7200, Shimadzu, Kyoto, Japan): Alanine aminotransferase (ALT), total protein (TP), albumin, glucose, creatinine, calcium, and inorganic phosphorus. Sodium, potassium, and chloride levels were measured using an automatic electrolyte analyzer (Ciba-Corning 644 Na/K/Cl, Ciba-Corning, Medfield, MA, USA). The anticoagulated blood sample was immediately used for the determination of haematological parameters. Haemoglobin concentration was determined spectrophotometrically, Packed cell volume (PCV) and Red Blood Cell (RBC) counts were determined as described by Dacie and Lewis (1991). Total White Blood Cell (WBC) count was determined using Neubauer haemocytometer. Blood constants (Mean Corpuscular Volume, Mean Corpuscular Haemoglobin and Mean Corpuscular Haemoglobin Concentration) were determined using the appropriate formulae as described by Schalm et al. (1986).

Laboratory results

The biochemical indices of the German shepherd bitch (GSB) on arrival at the clinic revealed very low blood calcium, phosphorus, potassium, glucose, total protein and albumin when compared with the normal physiological values for an adult German shepherd bitch (Table 1).

Table 2 shows the haematology of the perieclamptic GSB, with all parameters falling within the normal physiological range for healthy GSB.

Clinical management and outcomes after laboratory analysis

Following the outcome of the results (haematology and biochemistry) for the eclamptic GSB, slow intravenous administration of 1.0 ml/kg 10% calcium gluconate in 20 ml of 5% dextrose saline was carried out. The condition of the bitch improved significantly; it recovered from recumbence, seizures, general weakness after this intervention. The bitch was later discharged at the owner's insistence.

Kennel management of bitch after discharge and second clinical management

The bitch was induced to labour with 2 ml of oxytocin on the sixty second day of gestation at the owner's kennel; and whelped 3 weak puppies. All 3 puppies died immediately after parturition and the GSB condition worsened into serious muscular twitching, seizures, and convulsion. The bitch was re-presented recumbent and

Table 1. Biochemical indices of German shepherd bitch with periparturient eclampsia.

Parameters	Observed value	Normal range*
Total protein (g/l)	53.5	62.0-80.0
Albumin (g/l)	23.2	30.1 – 42.2
Globulin (g/l)	30.3	29.8 – 38.0
Creatinine (mg/dL)	5.3	5.2 - 5.8
Alanine amino transferase (U/L)	78.8	5 – 107
Glucose (mg/dL)	45.5	86.1 – 104.6
Potassium (mmol/L)	2.7	4.46 – 4.94
Sodium (mmol/L)	142.50	140.3 – 147.1
Calcium (mg/dL)	5.5	10.6 – 11.6
Phosphorus (mg/dL)	1.8	4.6 – 5.50
Chloride (mmol/L)	109.8	108.0 – 113.7

*Ariyibi et al., 2002, Choi et al., 2011.

Table 2. Haematological indices of German shepherd bitch with periparturient eclampsia.

Parameters	Observed Value	Normal range*
PCV (%)	40.5	39.4 – 44.2
[Hb] (g/dl)	14.6	13.5 – 15.3
RBC Count (x 10 ⁶ /μl)	7.2	6.7 – 7.8
WBC Count (x 10 ³ /μl)	11.3	10.5 – 14.8
MCV (fl)	64.5	61.0 – 69.0
MCH (pg)	22.0	21.0 – 23.0
MCHC (g/dl)	34.8	33.8 -37.0

*Ariyibi et al., 2002, Choi et al., 2011.

with dystocia at the veterinary clinic, FCAH&PT on the sixty third day of gestation.

Caesarean Section was indicated and conducted. Two foetuses were salvaged but very weak, and three confirmed dead. GSB presented continuous seizures and convulsion, slumped into deep coma and died; the salvaged puppies also died thereafter due to exhaustion.

Post-mortem findings

At post mortem, the following were observed:

1. Frothy exudates in the trachea, with Lungs that are heavy with fluid.
2. Swollen and slightly haemorrhagic cerebral hemisphere.
3. Swollen and reddened uterine wall (metritis).

DISCUSSION

Eclampsia, irrespective of the type, if not well managed is deadly because it does not give the inexperienced clinician or kennel operator enough time to think or act accordingly (Hall, 2015).

Gestation period is a physiological state dependent

largely upon nutritional requirements that far exceed those of the maintenance phase in non-pregnant bitches or studs. A pregnant or a post-parturient bitch falls back on the nutritional reserves stored up in the body before and during pregnancy while; a malnourished bitch will not have sufficient energy, protein, vitamins, minerals and electrolytes to support and see her through the gestation period (Smith, 2015). Malnourished bitch however, will manifest hypoproteinemia and hypoalbuminaemia, and this will worsen the hypocalcaemic state (Collins, 2011; Pathan et al., 2011).

Calcium is a mineral that plays a role in muscle contraction, formation of skeleton, changes how the brain functions, and stabilizes molecules that sit at the junctions between muscle and the nerve cells. Calcium works effectively in concert with other elements or minerals; such as phosphorus/phosphate stored alongside with calcium in bones; and vitamin D which increases calcium absorption from the intestines (Hanson et al., 2011; Hall, 2015).

During late pregnancy, the level of calcium in the blood will drop; because the pregnant dog's demand for calcium increases with the foetal and mammary gland development, the parathyroid gland requests for calcium from the bone repositories to supplement calcium levels as the need arises. This demand for calcium rises during whelping and lactation (Akiibinu et al., 2013; Bramlage,

2016).

The symptom of heavy panting in eclamptic bitch due to excessive loss of carbon dioxide will precipitate respiratory alkalosis; which favours protein (albumin) binding of serum calcium and will decrease blood levels of the biologically important ionized calcium, thus worsening hypocalcaemia, other electrolyte imbalances and will lead to recumbency (Collins, 2011). Also, panting can result from excessive accumulation of fluid in the trachea and lungs, thereby preventing the availability of oxygen. This fluid in the respiratory system and cerebral hemisphere arises due to severe changes in endothelial lining of the supplying blood vessels, which is similar to the manifestations in humans (Ku et al., 1993). Hypoglycaemia (low blood sugar) will result from the excessive exercise and due to muscular activities (contraction and relaxation) of twitching thereby depleting the stored up energy (glycogen) in the muscles; and will lead to seizures and tetany when the glucose is drained (Pathan et al., 2011; Hall, 2015).

Dystocia however, arises as a result of low levels of calcium which affects the effectiveness of myometrial contractions, the uterine muscle slides past and shortens, thus slowing down the process of labour and leading to nervousness, often resulting in puppy loss (Feldman and Nelson, 2004; Hall, 2015). The death of the bitch and puppies recorded in this case is a huge waste, and it is as a result of the insistence of the kennel operator to discharge the bitch.

The observed serum alanine amino-transferase (78.8 U/L) and creatinine levels (5.3 mg/dl) were within the normal ranges of physiological values of 5 to 107 U/L and 5.2 to 5.8 mg/dl respectively and being markers of the functionality of liver and kidney respectively (Whitbread, 2015). Findings suggested that the two organs were in good state of health (Ariyibi et al., 2002; Choi et al., 2011; Hanson et al., 2011). It was observed that periparturient eclampsia does not have effect on the haematology of the GSB, all the values fall within the normal physiological values (Ariyibi et al., 2002; Choi et al., 2011).

In conclusion, the periparturient eclampsia in GSB was caused by hypocalcemia; as a result of feeding of imbalanced ration to the GSB. It is therefore recommended that feeding of well-balanced dog ration to the bitch during both the growth and gestation period can help prevent the occurrence of canine eclampsia. The implementation of prompt and corrective treatment measures can also help to arrest the situation, thereby preventing maternal and foetal wastages. The major sources of calcium and phosphorus are from the diets fed to the dog. It is therefore pertinent to feed dogs especially breeding bitches diet to meet their nutritional requirements and give mineral/vitamin supplements to take care of any shortfalls.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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