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Clinico-laboratory and hydro-electrolytic imbalance study and therapeutic management of acute haemorrhagic gastroenteritis in German shepherd: A case report

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Abstract

Six month old male German shepherd was presented at Veterinary Clinical Complex, College of Veterinary Science, DUVASU, Mathura with the anamnesis of vomition, bloody diarrhoea, inappetence and lethargy since 2-3 days. Clinical examination revealed normal physiological parameters, skin elasticity, and mild dryness of mucus membrane without any abnormal ocular nasal secretion. Sampling was done to evaluate haematological, hepatorenal and hydro-electrolytic biomarker. Laboratory results indicate no change in haematological as well as hepatorenal biomarkers except reduced creatinine value. Hydroelectrolytic imbalance such as hypokalemia, hyponatremia and hypochloremia was observed. Based on clinical findings and laboratory results therapeutic management was initiated with intravenous isotonic crystalloid fluid, antiemetic, antacid, multivitamins and gastro protective drugs. Significant clinical improvement was started from day 3 post treatment and pup was fully recovered after 7 days of treatment.

Keywords: Vomition, diarrhoea, hepatorenal, hydroelectrolytic imbalance

Introduction

Canine population (*Canis familiaris*) exhibit great impact on the environment since its domestication about 15,000 years ago (12) and dog is the most dominant canid on earth. It is most devoted companion animal for man since long time. With the rising demand of pet the domestication is being increases in past few years with increasing cases of various infectious and non infectious diseases. Among various clinical manifestations, gastroenteritis is one of the most common multietiological (dietary, viral, bacterial, rickettsial, parasitic and miscellaneous) clinical conditions affecting the dogs of all age and breed especially growing pups (Bhat *et al*, 2013 and Banja *et al.*, 2002) ^[1, 2]. Common clinical signs include vomition, diarrhoea with or without blood, inappetence, lethargy, dehydration and anemia (Kataria *et al.*, 2020) ^[3]. Dehydration and electrolyte disturbance are most important complications of gastroenteritis (Elliott, 2007) ^[4] and leads to mortality in many dogs. Hence present study was performed to evaluate various haematological, hepatorenal biomarker and hydroelectrolytic imbalance in dog affected with acute gastroenteritis and its successful therapeutic management.

Materials and Methods

Case history and clinical examinations

Six-month-old male germen shepherded was presented to the Veterinary Clinical Complex, College of Veterinary Science, DUVASU, Mathura. Anamnesis revealed absence of scheduled vaccination, vomition (5-6 times) and bloody diarrhoea (3-4 times) since 2-3 days and oral administration of Eazypet® (combination of Praziquantel @ 50 mg, pyrental Pamoate @ 144mg and Fenbendazole @ 500 mg/kg) one week ago. Clinical examination revealed presence of reddish feces (Fig 1), normal physiological parameters (Rectal temperature, Respiration rate and Pulse rate), pink and mild dry mucus membrane, and skin

elasticity (tenting time 1 sec) and absence of any abnormal ocular or nasal secretion. Careful examination of peri-anal area showed traces of blackish loose feces. Abdominal palpation revealed no enlargement in any visceral organ and absence of bloat.

Sampling and laboratory examinations

After detailed clinical examination, five millilitre of whole blood sample was collected from cephalic vein by using sterile plastic syringe. Two ml of blood was transferred to sterile plastic vial containing anticoagulant (3.6 mg Tripotassium EDTA) and remaining 3 mL was transferred into clot activator vial (without anticoagulant) and allowed to clot at room temperature (25 ± 2 °C) for separation of serum via centrifugation (@ 4000rpm for 10 min). Haematological (Hb, PCV, TEC, TLC, DLC and Platelets), hepatorenal (Total protein, Albumin, ALT, BUN and Creatinine) and hydroelectrolytic (Na, K and Cl) studies were performed in clinical diagnostic laboratory following standard protocol. Obtained values for all parameters were compared with standard reference values to interpret any significant difference.

Calculation of fluid requirement

Total fluid requirement was calculated as per standard protocol. Dehydration was considered as 5% based on the condition of skin elasticity and mucus membrane. Maintenance fluid requirement (in ml) was calculated as body weight (in kg) $\times$ 30 + 70 while fluid deficit (in ml) was calculated as % dehydration $\times$ Body weight (in Kg) $\times$ 1000. Total calculated fluid was given in divided dose i.e. half in morning and then half in evening (Tello L., 2017) [5].

Therapeutic management

Treatment was started with intravenous fluid therapy consist of ringer's lactate (200 ml, OD) and 10% dextrose normal saline (150 ml, OD) along with antiemetic (Ondansetron @ 0.2 mg/kg IV, BID), broad spectrum antibiotic (Ceftriaxone @ 30 mg/kg IV, OD), combination of vitamin B₁₂, folic acid, niacinamide and vitamin-C (Eldervit® @ 0.5 ml total dose, IV, OD), antacid (Pantoprazole @ 1 mg/kg IV, OD and Ranitidine @ 2 mg/kg, SC, OD), Hemocoagulase (Botropase @ 1 mL total dose, IV) and oral administration of gastro protective agent (Sucralfate @ 4 ml PO, every 6 hours). Dog was clinically cured after seven days of therapy but normal appetite was regained 10 days after beginning of therapy.

Results and Discussion

All haematological parameters lie in reference range while among hepatorenal biomarkers only creatinine was lower than reference range (Table 1). Hypokalemia, hyponatremia and hypochloremia was observed (Table 1). Diversion of Hb and PCV are towards the lower range in present case may attribute to mild intestinal blood loss due to duodenal ulcers (Bhat *et al.*, 2013) [1] while neutrophil count is towards higher side which may indicates involvement of infectious agent in the pathogenesis of gastroenteritis. Lower creatinine value may be attributed to less muscle mass or poor nutritional input (Ostermann *et al.*, 2016) [6]. Hypokalemia and hyponatremia may be due to intestinal loss via diarrheic fluid and vomitus (Agnihotri *et al.*, 2017; Haligur *et al.*, 2009 and Joshi *et al.*, 2012) [7, 8, 9] while hypochloremia observed in present case may be attributed to loss of chloride ions through vomition and diarrhoea (Burchell *et al.*, 2014) [10]. Metabolic acidosis, caused by loss of bicarbonate via diarrheic fluid can be overcome by ringer's lactate solution. Ringer lactate is an isotonic crystalloid having combination of electrolyte (sodium, chloride, potassium, calcium) with sodium lactate with an osmolality of 273 mOsm/L and pH of about 6.5 (Singh *et al.*, 2022) [11]. Conversion of lactate into pyruvate to form carbon dioxide and water which in turn produces carbonic acid and its dissociated product (bicarbonate) justify the used of ringer's lactate in present case (Gladden, 2004). Ondansetron has antiemetic as well as antinauseant effect by inhibition of serotonin₃ (5-HT₃) receptors with constipation as one of the common side effect which may be beneficial in diarrheic cases (Markham and Sorkin, 1993) [13]. Altered permeability of intestine may cause nutrient loss (Marks, 2013) [14] and allow the wide varieties of bacteria to absorb into circulation causing sepsis and multiple organ failure (Colbert *et al.*, 2017) [15]. To overcome such type of outcome broad spectrum antibiotics and multivitamins are required. Excess production of gastric acid contribute to vomition, hence, use of antacid and H₂ receptor antagonist is essential to reduce gastric acid production by inhibiting proton pump on parietal cells of stomach and blocking histaminic receptors respectively. Sucralfate is basically an aluminium salt of sulfated disaccharide (sucrose sulfate) which form a complex with protein present within ulcer, hence protecting the ulcerated surface from further damage (Nakazawa *et al.*, 1981) [16]. It also increases the mucosal concentration of prostaglandins which is important for faster mucosal healing (Candelli *et al.*, 2000) [17].

Table 1: Showing alteration in parameters under study in gastroenteritis affected dog

Parameters		Values	Reference range (Merck Veterinary Manual, 11 th edition)
Haematological markers	Hb (g/dl)	11.9	11.9-18.9
	TEC ($\times 10^6$)	5.49	4.95-7.87
	PCV (%)	35.7	35-57
	TLC ($\times 10^3$)	7.5	5-14.1
	N (%)	84	58-85
	L (%)	16	8-21
	E (%)	03	0-9
Hepatorenal biomarkers	PLTs ($\times 10^3$)	331	211-621
	ALT (IU/L)	28	10-109
	ALB (mg/dl)	3.9	2.3-3.1
	TP (mg/dl)	5.7	5.4-7.5
	BUN (mg/dl)	11.5	8-28
Hydroelectrolytic imbalance	CRE (mg/dl)	0.22	0.5-1.7
	Na (mEq/L)	125	142-152
	K(mEq/L)	3	3.9-5.1
	Cl(mEq/L)	81	110-124



Fig 1: Dog with bloody diarrhea presented in clinic

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