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THERAPEUTIC MANAGEMENT OF DOGS AFFECTED WITH CANINE PARVO VIRUS (CPV) INFECTION

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Abstract: Among the viruses, canine parvovirus was considered as highly contagious and causes acute haemorrhagic gastroenteritis and myocarditis in dogs. In the present study, faecal samples from twenty four dogs suspected for canine parvovirus (CPV) with symptoms of vomiting, bloody diarrhoea and fever were tested with sandwich lateral flow immunochromatography kit. Among them, seven patients positive for CPV infection showed fruitful recovery after treatment with ceftriaxone with tazobactam, ondansetron, ethamsylate and fluid therapy.

Keywords: Canine parvovirus, Dogs, treatment.

Introduction

In dogs, infection caused by canine parvovirus 2 is one of the most significant viral causes of acute hemorrhagic enteritis and myocarditis, and is one of the most important pathogenic viruses. This highly contagious, often fatal disease is caused by strains of CPV-2 (2, 2a, 2b and 2c) (Greene and Decaro., 2012). Clinical signs range from nonspecific signs such as anorexia, depression, lethargy, and fever to typical signs like vomition and mucoid to haemorrhagic bloody diarrhoea. When left untreated, CPV infection progresses rapidly and causes severe dehydration, disseminated intravascular coagulation, bacterial translocation, and sepsis, with a mortality rate that exceeds 90%. With prompt recognition and aggressive supportive therapy, survival rates approach 80 to 95 percent (Crawford and Sellon.,2010). Because specific treatment against parvoviral enteritis remains elusive, supportive care and basic therapeutic principles are still applicable for the management. Best management

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strategy requires admission and aggressive treatment with crystalloid fluids, synthetic and natural colloids, correction of hypoglycemia and any electrolyte disturbances (Goddard and Leisewitz.,2010). Hence, the present study was undertaken to study the therapeutic management of canine paroviral enteritis in dogs.

Materials and Methods

A total of twenty four dogs presented with signs suggestive of canine parvoviral infection such as vomitions, bloody diarrhoea, fever, weakness, inappetence, lethargy etc., were selected for the present study. Faecal samples were collected with sterile swabs and tested with sandwich lateral flow immunochromatography kit (Scan Vet^{TM} PARVO from M/S INTAS Pharmaceuticals Ltd., Matoda- 382210, Ahmedabad, India). Among them, seven patients positive for the canine parvoviral infection were subjected to detailed clinical examination from the day of presentation upto clinical recovery (0^{th} day to 5^{th} day). Whole blood and serum were collected from the patients on the day of presentation (0^{th} day) and 5^{th} day to study the alterations in haematobiochemical parameters. The patients were treated with the following drug regimen: ceftriaxone with tazobactam @ 20 mg/kg b.wt., intravenously twice a day, ondansetron @ 0.2 mg/kg b.wt., intravenously twice a day upto the remission of emesis, ethamsylate @ 10 mg/kg b.wt., was given intravenously in cases with severe haemorrhagic enteritis, fluid therapy was initiated with isotonic Ringer's lactate (RL) as the initial choice for replacement along with which 5 % dextrose normal saline (DNS), potassium chloride and hetastarch were supplemented in required cases. Apart from them, dietary recommendations were advised for the patients. The patients were monitored regularly for 5 days. The results obtained were subjected to statistical analysis as per the procedures described by Snedecor and Cochran (1994) and by using SPSS (15.0) software and Graph pad Prism software (6.0"version).

Results and Discussion

In the present study, out of twenty four pups, seven pups positive for CPV infection with sandwich lateral flow immunochromatography assay (Scanvet^{TM} PARVO) as shown in Figure No.1 were randomly selected. Parenteral administration of broadspectrum antibiotics is warranted in parvoviral enteritis because of the combination of severe disruption of epithelial

barrier (potentially allowing entry of bacteria into the blood stream) and peripheral neutropenia increasing the risk of sepsis (Rewerts and Cohn., 2000). In the present study, patients were treated with ceftriaxone in combination with tazobactam. In dogs with parvoviral enteritis, parenteral administration of third generation cephalosporins can be used as sole treatment alternative to achieve the desired spectrum (Greene and Decaro., 2012). Tazobactam is a β- lactamase inhibitor (Sandhu.,2013). Earlier parvoviral infected dogs were treated with ceftriaxone in combination with tazobactam with variable results (Roy *et al.,* 2010). Ondansetron (antiemetic) used in the present study is a serotonin ($5HT_3$) receptor antagonist that acts peripherally and centrally to inhibit vomiting (Mantione and Otto,, 2005). Ondansetron has been used in small animals suffering from refractory vomiting that has not responded to other antiemetics, vomiting induced by chemotherapy, parvovirus and hepatic lipidosis. Earlier ondansetron was administered for the control of emesis in parvoviral affected dogs (Bhat *et al.,* 2013 and Yatoo *et al.,* 2013). Ethamsylate, a systemic haemostatic agent that reduces capillary bleeding was used in the present study. Following systemic administration, the mean bleeding time is significantly reduced; mainly used for the treatment of capillary haemorrhage and haematemesis (Sandhu.,2013). Fluid therapy was indicated to correct dehydration, reestablish effective circulating blood volume, as well as to correct electrolyte and acid- base disturbances and is the main stay of managing puppies with parvoviral enteritis (Prittie., 2004). In the present study, lactated Ringer solution was administered initially as it is a balanced electrolyte solution and is isotonic to blood (Goddard and Leiseweitz., 2010), earlier reported by Dongre *et al* (2013) and Yatoo *et al* (2013). In the present study, hypoglycaemic puppies (2) were also supplemented with 5 % dextrose normal saline solution, which may be necessary to prevent hypoglycemia once the initial critical hypoglycemia has been addressed (Prittie.,2004). In the present study, hypokalemic pups (2), fluids were supplemented with potassium chloride based on their serum potassium levels (<2.0 mmol/l- 20 mEq; 2.0–2.5 mmol/l- 15 mEq; 2.5–3.0 mmol/l- 10 mEq; 3.0–3.5 mmol/l- 7 mEq). The clinician should ensure that the rate does not exceed 0.5 mEq/ kg/ hr as it may have adverse effects on normal cardiac function (Brown and Otto., 2008). Bastan *et al* (2013) used potassium chloride along with fluids in the treatment of CPV affected puppies and

obtained better results. In the present study, two severely dehydrated pups were supplemented with hetastarch, a nonprotein synthetic colloid at the rate of 10 ml/kg/day. Savigny and Macintire (2010) used hetastarch in CPV affected dogs. Besides above, dietary recommendations like food should be withheld in CPV infected puppies until the diarrhoea and vomiting subside (Nandi and Kumar., 2010), because feeding can exacerbate vomiting (Rewerts and Cohn., 2000). Affected pups with vomiting and diarrhoea were typically maintained NPO (nothing by mouth) to rest the gastrointestinal tract or "Nil per os" for 24-72 hrs has been recommended (Goddard and Leisewitz 2010). Diets in the initial feeding period should be easily digestible and low in fat because villus structure and function may require a number of days to return to normal (McCandlish., 1998). Pattern of clinical recovery of the patients in this study is presented in Table 1. and Figure 2. One pup which was febrile (105^0 F), severely dehydrated (STT- 10 secs) and with bloody diarrhoea collapsed on 2^{nd} day of therapy. The mean haematological and serum biochemical values of pups before and after therapy in comparison with healthy control dogs are presented in Table 2.

Conclusion

Based on the findings of present study, it was concluded that the prominent clinical signs noticed among the affected pups were dullness, anorexia, bloody, foul smelling diarrhoea, varying degrees of dehydration, pyrexia and tachycardia. After therapy, normalcy was attained in majority of haematobiochemical parameters. Clinical recovery was evident in all the patients and was influenced by the age, time of presentation and severity of haematobiochemical alterations apart from the clinical management with broad spectrum antibiotics, symptomatic and supportive therapy.

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Figure 1.A. Positive result B. Negative result

Figure 2. 0^{th} day 5^{th} day of therapy

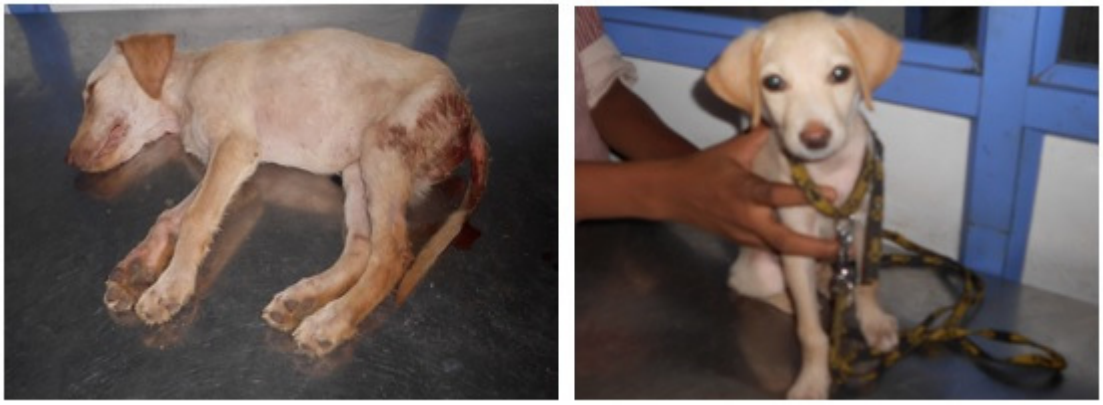

Table 1. Pattern of clinical recovery

Parameter		0^{th} day	1^{st} day	2^{nd} day	3^{rd} day	4^{th} day	5^{th} day
General activity	Dullness	7	7	7	3	1	-
	Normal	-	-	-	3	5	6
Appetite	Anorexia	5	5	4	-	-	-
	Inappetence	2	2	3	3	1	-
	Satisfactory	-	-	-	3	5	6
Vomiting	Whitish frothy	2	2	2	-	-	-
	Yellowish	1	2	1	-	-	-
	Plain watery	1	2	1		-	-
	Hematemesis	3	1	-	-	-	-
	Absent	-	-	3	6	6	6
Diarrhoea	Greenishyellow, foul smell	2	-	-	-	-	-
	Bloody, foul smell	5	7	7	2	-	-
	Semisolid,foul smell	-	-	-	1	-	-
	Absent	-	-	-	3	6	6
Dehydration	Mild	3	4	4	2	1	1

	Moderate	2	2	2	1	-	-
	Severe	2	1	1	-	-	-
	Normal	-	-	-	3	5	5
Temperature	Fever	3	3	3	1	-	-
	Normal	4	4	4	5	6	6
Heart rate	Tachycardia	4	2	2	-	-	-
	Normal	3	5	5	6	6	6

Table 2. Mean haematological and serum biochemical values of pups before and after therapy (Mean±S.E)

Parameter	Control group (n=6)	CPV positive pups	
		Before therapy (0^{th} day)	After therapy (5^{th} day)
Hb (gm%)	12.92±0.25^{a}	11.37±1.46^{a}	9.25±0.68^{b}
PCV (%)	38.25±0.37^{a}	29.3±2.26^{b}	25.22±1.48^{b}
TEC (m/cumm)	6.28±0.89^{a}	5.2±0.76^{a}	4.01±0.31^{a}
TLC/cumm	8533.33±379.18^{a}	12314±2970.04^{a}	8966.67±675.61^{a}
DLC			
N (%)	70.0±0.73^{a}	78.5±2.94^{b}	73.83±1.11^{ab}
L (%)	22.67±0.67^{a}	13.83±2.31^{b}	20.33±0.84^{a}
M (%)	4.17±0.31^{a}	3.67±1.2^{a}	3.5±0.34^{a}
E (%)	3.8±0.49^{a}	3.83±0.72^{a}	3.4±0.51^{a}
Platelets (/cumm)	456166.66±22918.2^{a}	275285.7±61853.75^{b}	419500±46484.98^{a}
Blood urea nitrogen (BUN) (mg/dl)	10.47±1.13^{a}	38.7±10.53$^{\mathbf{b}}$	13.5±1.62$^{\mathbf{a}}$
Total serum protein (gm/dl)	7.17±0.09^{a}	6.52±0.52^{a}	6.61±0.45^{a}
Blood glucose (mg/dl)	100.67±6.69^{a}	115.86±14.31^{a}	113.17±4.79^{a}
Serum potassium (mmol/l)	4.82±0.11^{a}	3.7±0.22^{b}	4.45±0.34^{ab}
Serum sodium (mmol/l)	144.03±0.81^{a}	140.71±4.13^{a}	143.25±0.75^{a}
Serum chloride (mmol/l)	111.33±1.06^{a}	103.71±1.87^{b}	110.61±1.46^{a}

Means followed by same superscript(s) don't differ significantly