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Clinical Articles

Coagulation Profile and D-dimer in Labrador Puppies with Parvo Viral Enteritis

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Abstract

Management of puppies with parvo viral enteritis is a major challenge. Complicating factors include sepsis and coagulation status. In a study of PCR confirmed parvo affected labrador puppies, a hypercoagulable status was observed. Haematobiochemical examination revealed decreased hemoglobin, Packed Cell Volume and total erythrocyte count, hypoproteinaemia and hypoalbuminemia. The Activated Partial Thromboplastin Time (aPTT) was markedly prolonged. D – Dimer status was negative and was unremarkable.

Keywords: Parvo viral Enteritis - Prothrombin Time - aPTT - D-Dimer

Introduction

Canine Parvovirus (CPV) is considered as the most pathogenic that affects the young dogs and remains an important cause of morbidity and mortality in young dogs. Critical care management of these puppies are essential and it requires advanced monitoring, as there exists laboratory evidences of hypercoagulability. This study documents the D-Dimer and Coagulation Profile of Labrador puppies affected with parvo viral enteritis.

Materials and Methods

Eight Labrador retriever puppies aged between 3 months to 5 months with the signs of canine parvo viral enteritis such as vomiting, bloody diarrhoea, fever, weakness, inappetence, lethargy etc., were randomly selected for this study. These dogs were confirmed to be positive through PCR (polymerase Chain Reaction) for parvo viral enteritis. The selected cases were subjected to thorough physical examination. Haemoglobin (Hb), Packed Cell Volume (PCV), Total Erythrocyte Count (TEC), total leucocyte count, differential count and platelet count were analyzed using automated hematology analyzer (BC-2800 Vet, Mindray, Asia Pacific).

Total proteins, albumin and globulin were estimated with automated biochemistry analyzer (A15 random access analyzer, Biosystems, Barcelona, Spain) using standard diagnostic kits (Agappe Diagnostics, India). For Coagulation profile, nine parts of blood collected non-traumatically was placed in a tube containing 1 part of 3.2 per cent Tri-sodium citrate solution (0.109M) and mixed gently. Plasma was harvested by centrifugation at 3000rpm for 15min. The harvested plasma was then used for coagulation assays. Activated Partial Thromboplastin Time (aPTT) and Prothrombin Time (PT) with the help of commercial coagulation test kits (Agappe Diagnostics, India) using a Coagulation Analyzer (Mispa Clog, India). ELISA assay was used for D-dimer estimation. DNA was extracted by stool DNA extraction kit. PCR was standardised for the primer set pCPV- 2a and pCPV- 2b, as reported by Pereira *et al.* (2000) with slight modifications.

Results and Discussion

Clinical signs observed included vomiting, bloody diarrhoea, fever, weakness, inappetence and lethargy and was in accordance with previous reports (Salem, 2014). Decrease in values of haemoglobin, packed cell volume, total erythrocyte count (RBC) was observed (Table 1). This might be due to virus induced suppression of bone marrow along with alterations in erythroid, myeloid and megakaryocytes causing these alterations. It is also attributed to intestinal haemorrhage (Salem, 2014). Leucopaenia was observed to be associated with poor prognosis and needed aggressive treatments (Woods *et al*., 1980; Pogieterl *et al*., 1981;

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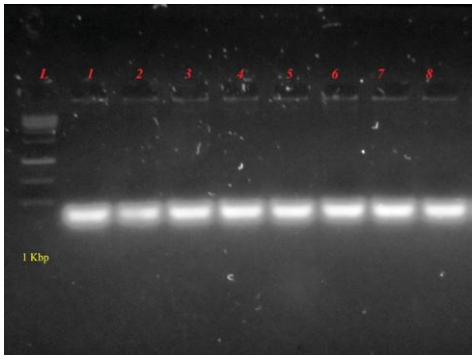
O'Sullivan *et al*., 1984). In this study, hypoalbuminemia was observed in all cases and hypoproteinaemia was observed in five cases (Table 2). Similar findings were reported by Dongre (2014) and might be due to direct loss of protein in the form of blood and other proteinous content, the shift of protein poor extra vascular fluid in to the vascular compartment and delay in synthesis of protein. Documented PT in this study ranged from 7.2 to 7.8sec (Table 3), which correlated with findings of Ford and Mazzaferro (2006).

Table 1. Haematobiochemical, clotting profile and D- dimer (MEAN±S.E)

Parameters	Units	Observed Range	Mean±S.E.	Reference range*
AGE (Months)		3-5	3.75±0.31	
Sex		n=8 (6-male & 2-female)		
PCV	**%**	18.9-40.0	29.03±2.58	37-55
Hb	**g%**	7.1-14.1	10.44±0.92	12.0-18.0
RBC	**m/Cmm**	3.82-6.41	4.88±0.35	5.5-8.5
WBC	**/Cmm**	2600-12800	6787.50±1387.76	6000-17000
Neutrophil	**$\times 10^3$ /Cmm**	70-78	73.00±1.02	3000-11500
Lymphocyte	**$\times 10^3$ /Cmm**	18-26	22.88±1.09	1000-4800
Monocyte	**$\times 10^3$ /Cmm**	0-5	2.25±0.53	150-1350
Eosinophils	**$\times 10^3$ /Cmm**	0-4	1.63±0.53	100-1250
Basophils	**$\times 10^3$ /Cmm**	0	0.00±0.00	Rare
Platelets	**Lakhs/Cmm**	228000-595000	377250.00±46037.16	200000-500000
Total Protein	**g/dl**	3.12-7.73	4.84±0.49	5.3-7.6
Albumin	**g/dl**	1.20-2.18	1.69±0.12	3.2-4.7
Globulin	**g/dl**	1.79-5.55	3.14±0.44	1.5-3.5
Prothrombin Time (PT)		7.2-7.8	7.46±0.08	5.1-7.9 sec
International Normalized Ratio (INR) Value		0.44-0.66	0.53±0.03	-
Activated partial Thromboplastin Time (aPTT)		12.6-18.0	15.54±0.77	8.6-12.9 sec
D-Dimer		-	Negative (< 0.5)	-

Plate 1. Diagnosis Of Canine Parvo Virus (Cpv) By Pcr



Lane 1-8: Positive samples L: 1Kbp DNA ladder

Activated Partial Thromboplastin Time (aPTT) in the present study ranged from 12.6 to 18.0sec, which was markedly prolonged when compared to the findings of Ford and Mazzaferro (2006). A prolonged aPTT could be due to deficiency of intrinsic pathway or contact factors. If PT is normal, then a prolonged aPTT is considered to be due to a deficiency of factors VIII (Hemophilia A and von Willebrand Disease), IX and XI. Prolongation of both aPTT and PT suggests a deficiency or inhibition of the common pathway coagulation factors (factor X, V, and II), or a qualitative or quantitative fibrinogen defect (Lopez *et al*., 2005; Vlasin *et al*., 2004). As aPTT is prolonged in this study, this underscores the need for tailor made therapeutic planning with inclusion of plasma products administration as part of therapy in severely affected puppies. In the present study, the Mean±S.E. values of D-Dimer was Negative (<0.5) which correlated with the findings of Otto *et al.* (2000).

Conclusion

Prothrombin Time (PT) in parvo enteritis affected puppies ranged from 7.2 to 7.8sec and the Activated Partial Thromboplastin Time (aPTT) ranged from 12.6 to 18.0sec and is indicator of hypercoagulable state. A prolonged aPTT underscores the need for inclusion of plasma products administration as part of critical care management.

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