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RESEARCH ARTICLE

AMELIORATIVE EFFECTS OF AUTOGENOUS ASCITIC FLUID REINFUSION IN DOGS WITH ASCITES

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ABSTRACT

Ascites a common manifestation of chronic hepatobiliary disorder is difficult to treat and several therapeutic modalities were available. In this study concentrated autogenous ascitic fluid reinfusion was tried for the management of dogs with severe ascites. Ascites was ameliorated in all treated dogs as comparable as and better than the standard therapy. It can be concluded that auto reinfusion of ascitic fluid is a safe, better and cost effective treatment modality in the effective management of ascites in dogs.

INTRODUCTION

Ascites is defined as pathological accumulation of serous fluid in the peritoneal cavity and is usually reserved for a transudate that results from liver or right side heart failure. Reduced oncotic pressure due to hypoalbuminemia occurring as a result of protein loosing enteropathy (PLE), protein loosing nephropathy (PLN), liver failure (chronic hepatitis/cirrhosis) and increased hydrostatic pressure due to portal hypertension, hepatic vein occlusion, congestive heart failure can cause fluid accumulation in the abdomen. The development of ascites occurs when there is an alteration in starling's forces, including increased venous or lymphatic hydrostatic pressure, vascular permeability, increased intra peritoneal oncotic pressure and decreased capillary oncotic pressure (Richter, 2003). Extensive literature has been published about various animals on ascites due to hepatobiliary dysfunctions and their remedies. For effective treatment of hepatobiliary diseases, therapy requires disease directed interventions with the aim to eliminate the causative factors by reducing hepatic inflammation, minimizing fibrosis, controlling complications and initiating hepatic regeneration. Low sodium diet and diuretics (furosemide and spironolactone) are the most commonly used means of controlling ascites. But some of the animals failed to respond diuretics especially in furosemide because of high level of serum aldosterone in many cirrhotic animals (Center, 2006). Cirrhotic patient with ascites is characterized by haemodynamic dysfunction i.e. development of refractory ascites and hepatorenal syndrome (HRS). Both refractory ascites and HRS is independent predictor of short survival of patient (Salerno *et al*., 2010). Therapeutic paracentesis only be performed, if the ascites is life threatening (Bexfield and Watson, 2009). Other therapeutic management of ascites in humans are large volume paracentesis and or intravenous albumin infusion, transjugular intrahepatic portosystemic shunt (TIPS), peritoneovenous shunt and liver transplantation (Bjelakovic *et al*., 2001). Reinfusion of cascade filtrated and concentrated ascitic fluid is a rapid, safe, and effective treatment for human patients with tense ascites; it appears to have fewer side effects than more traditional methods and importantly does not require administration of heterologous plasma derivatives (Rossaro *et al*., 1993). Reinfusion of concentrated ascitic fluid has been used as an alternative treatment with different modalities and with controversial results in human patients with tense ascites (Chiyoda *et al*., 1992; Borzio *et al*., 1995; Graziotto, 1997; Narwan, 2000). But these therapeutic modalities are not used in animals except for few unvalidated reports wherein ascitic fluid was used for treatment of shock in dogs. Therefore, new therapeutic modalities employing the use of ascitic fluid can be a medical approach with standard therapy against chronic liver disorders.

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MATERIALS AND METHODS

Clinical cases

Twelve clinical cases of dogs with ascites due to hepatobiliary dysfunction (showing signs of distended abdomen, anorexia, vomiting, icteric mucous membrane and fluid thrill during tactile percussion) presented at the Small Animal Medicine Out-Patient Unit of the Referral Veterinary Polyclinic (RVP), Indian Veterinary Research Institute, Izatnagar were utilized for the study. Detailed history and clinical examination findings were recorded. Diagnostic abdominal paracentesis (Beal, 2005) was done and ascitic fluid was collected following all aseptic condition. Ascitic fluid samples were analyzed for its colour, turbidity, specific gravity, total cell count, total protein (TP) and albumin content, as well as microscopic examination for the cell types present (Alleman, 2003).

Procedure

Six ascitic dogs (Group I) were given standard therapy with frusemide 2mg/kg, silymarin 25 mg/kg, amino acids infusion 20 ml (for 2 days only) and supportive symptomatic therapy were given for a duration of 10 days. Remaining 6 dogs (Group II) were given reinfusion of concentrated autogenous ascitic fluid (AAF) which were negative for neoplastic cells and infected ascites (microbiological culture) along with frusemide 2mg/kg, silymarin 25 mg/kg and supportive symptomatic therapy. Around 500 ml of ascitic fluids were

collected from each dog after initial testing and frozen at -20° C. The frozen material was thawed after 24 hours and the initial fraction of 20-25 ml was infused intravenously into the same dog along with the supportive therapy as per the method of Chiyoda and co-workers (1992) with slight modifications. Infusion of autogenous ascitic fluid was done for 2 days only. Total protein and albumin level was estimated before and after freezing of ascitic fluid. Blood was collected from saphenous/cephalic or jugular vein in clean dry sterilized non-heparinised vial for biochemical analysis at the day of presentation and 10th day after therapy. After one hour of clotting, blood was subjected to centrifugation at 3000 rpm for 5 minutes. Collected serum was stored in deep freeze at –20°C for biochemical estimation. Standard liver function test and other diagnostic tests as well as the improvement in clinical signs were utilized to assess the therapeutic efficacy. All parameters were evaluated for pre and post treatment phase and compared with the dogs receiving standard therapy.

RESULTS AND DISCUSSION

Clinical signs recorded in ascitic dogs were abdominal distension (10days - 1month), inappetance, lethargy, respiratory distress, vomiting, melena and diarrhea. The clinical signs of hepatobiliary diseases are relatively vague and variable in nature however similar findings were recorded by various authors (Hall, 2005; Saravanan *et al*., 2012; Watson and Bunch, 2009) in dogs with ascites. Analysis of the abdominal effusion revealed that the fluid is of clear transudate type with few lymphocytes, macrophages, neutrophils and mesothelial cells. Transudative type of ascites were noticed as depicted by the specific gravity, total cell count, total protein, albumin and serum ascites albumin gradient (SAAG) of the ascitic fluid (Table 2) which is typically associated with hepatobiliary disorders. Burgess (2004) stated that transudates are typically clear and colourless with protein concentration of less than 2.5 g/dl and < 2500 cells/ml. Cytologically these fluid contain mostly mononuclear cells such as lymphocytes, macrophages and mesothelial cells with low number of non-degenerate neutrophils (Alleman, 2003). After therapy dogs of both the group (I & II) showed relief from ascites by means of reduced abdominal distension and respiratory distress with improved appetite. Critical analysis of clinical signs revealed better ameliorative effect of AAF supplemented group than standard therapy by means of faster and better improvement in the ascitic condition of the dogs (Table 1).

Table 1. Clinical score of ascitic dogs before and after therapy

Parameters	Group I (n=6)		Group II (n=6)	
	0 day	10 day	0 day	10 day
Abdominal distension/ascites	+++	+	+++	±
Inappetance	+++	+	+++	_
Lethargy	+++	_	+++	_
Respiratory distress	+++	+	+++	_
Gastrointestinal signs (vomiting, melena, diarrhea)	++	_	+++	_

Table 2. Physical, microscopic and biochemical characteristics (Mean ± SE) of ascitic fluid on the day of presentation of ascitic dogs

Characteristics	Group I (n=6)	Group II (n=6)
Colour	Colourless	Colourless
Turbidity	Clear transudate	Clear transudate
Specific gravity	1.016 ± 0.0	1.015 ± 0.0
Cell count (Cells/ cmm)	244 ± 8.3	263 ± 7.7
Total Protein (g/dl)	1.401 ± 0.24	1.798 ± 0.64
Albumin (g/dl)	0.98 ± 0.22	0.96 ± 0.31
SAAG (g/dl)	1.14 ± 0.20	1.19 ± 0.37
Total Protein after freezing and thawing (g/dl)	-	4.70 5 ± 0.39
Albumin after freezing and thawing (g/dl)	-	1.94 5 ± 0.16

Table 3. Mean ± SE values of serum biochemical profile of ascitic dogs (Before and after therapy)

Parameters	Group I (n=6)		Group II (n=6)	
	Day 0	Day 10	Day 0	Day 10
BUN (mg/dl)	43.93±9.98^{b}	29.58±5.71^{ab}	35.07±6.96^{ab}	19.2±3.21^{a}
Creatinine (mg/dl)	1.5±0.26	0.77±0.18	1.53±0.4	0.68±0.12
Prothrombin time (Sec)	11.3±0.71^{a}	7.6±0.42^{b}	13.3±0.98^{a}	6±0.44^{b}
ALT (U/L)	141±34	67±11	121±34	61±17
AST (U/L)	134±39	65±7.7	140±22	71±8.8
ALP (U/L)	183±28^{a}	78±8.9^{b}	203±24^{a}	84±6.4^{b}
GGT (U/L)	19±1.9^{a}	9.3±0.8^{b}	21±0.9^{a}	9.7±1.03^{b}
Total Protein (g/dl)	4.8±0.22^{a}	4.9±0.18^{a}	5.1±0.23^{a}	6.1±0.28^{b}
Albumin (g/dl)	2.1±0.2^{a}	2.5±0.15^{ab}	2.1±0.17^{a}	2.8±0.14^{b}
Globulins (g/dl)	2.7±0.13^{ab}	2.3±0.16^{a}	3.0±0.07^{ab}	3.2±0.2^{b}
A:G ratio	0.77±0.04	1.08±0.01	0.7±0.03	0.87±0.04
Total bilirubin (mg/dl)	1.01±0.08^{bc}	0.74±0.04^{ab}	1.11±0.11^{c}	0.71±0.05^{a}

Means with different superscript on the same column differ significantly ($p<0.05$)

Serum biochemical profile of ascitic dogs (Table 3) at the day of presentation showed significant increase in BUN, Prothrombin time (PT), ALP, GGT and total bilirubin levels with moderate increase in Creatinine, ALT, AST and significantly decreased values of total protein, albumin and A:G ratio. Hepatobiliary disorders is characterized by elevated enzyme levels such as ALT, AST (Tennant and center, 2008) ALP, GGT, prolonged PT (Nelson and Couto, 1998) and decreased total protein, albumin as liver has the primary role of protein synthesis which is affected significantly in liver diseases (Webster, 2005). Ascites leads to high level of albumin distribution in abdominal effusion thereby lowering the blood albumin concentration leading to decrease in the plasma oncotic pressure and aggravates the formation of ascitic fluid (Richter, 2003; Tennant and Center, 2008). Determining serum albumin levels and prothrombin time are often considered tests of liver function. This is mainly because hepatic synthesis of albumin tends to decrease in liver disease. An increase in prothrombin time depends on the decreased synthesis of liver-derived coagulation factors. Both the groups showed significant decrease in BUN, PT, ALP and insignificant decrease in Creatinine, ALT, AST wherein all the values reached normal reference range by the end of the study. Group II showed significant increase in the TP as compared with Group I dogs which revealed better efficacy in AAF supplementation than amino acid infusions.

Albumin concentration increased in both the treated groups indicating revival of liver function however the increase is higher in group II substantiating the better ameliorative efficacy of AAF. Further group II dogs had the advantage of reduced volume of effusion as paracentesis was done to remove fluids for reinfusion. Various authors reported that reinfusion therapy is better in the management of ascites in human patients (Chiyoda *et al*., 1992; Borzio *et al*., 1995; Graziotto, 1997; Narwan, 2000). Minami (1990) reported that in veterinary medicine, treatment with ultrafiltration and reinfusion of the animal's own ascitic fluid for intractable ascites or massive ascites in the dog may be useful and safe in controlling the ascites as well as better treatment protocol of the basic diseases. In conclusion, autogenous reinfusion of concentrated ascitic fluid is a rapid, safe and cost effective treatment modality for the management of dogs with severe to massive ascites of hepatic origin and may be of better therapeutic approach in controlling the diseased condition.

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REFERENCES

Alleman, A.R. (2003). Abdominal, thoracic and peritoneal effusion. *Vet Clin Small Anim Pract.*, 33: 89-118.

Beal, M.W. 2005. Approach to the acute abdomen. *Vet Clin Small Anim*, 35: 375 – 396.

Bexfield, N. and Watson, P. (2009). Treatment of canine liver disease, 2.Managing clinical signs and specific liver disease. *In Practice*, 31: 172 -180.

Bjelakoviv, G., Tasie, T., Stamenkoviv, I., Katie, V., Otasinoviv, M. and Bjelankovic, G. (2001). Biochemical, cytological and microbiological characteristics of the cirrhotic, malignant and mixed ascites. *Archive of oncology*, 9: 95- 101.

Borzio, M., Romagnoni, M., Sorgato, G., Bruno, S., Borzio, F., Tarasco, V., Tetta, C. and Modignani, R.L. 1995. A Simple Method for Ascites and Reinfusion Concentration. *Digestive Diseases and Sciences*, 40(5):1054-1059.

Burgees, L.J. (2004). Biochemical analysis of pleural, peritoneal and pericardial effusion – review. *Clin. Chimica. Acta.*, 343: 61 -81.

Center, S.A. (2006). Fluid, electrolyte and acid – base disturbances in liver disease. In fluid, electrolyte and acid base disorders in small animal practice, 3rd ed. Dlbartola, S.P (ed), Sanders Elsevier, St. Louis Missouri: pp 437 -473.

Chiyoda, S., Morikawa, T., Matsuo, K. and Masuya, S. 1992. Reinfusion of Autogenous Ascitic Fluid Concentrated by Freezing in Patients with Intractable Ascites. *Internal Medicine*, 31(3):325-332.

Graziotto, A., Rossaro, L., Inturri, P. and Salvagnini, M. 1997. Reinfusion of Concentrated Ascitic Fluid versus Total ParacentesisA Randomized Prospective Trial. *Digestive Diseases and Sciences*, 42(8):1708 -1714.

Hall, E.J. (2005). Ascites. In: BSAVA manual of canine and feline Gastroenterology, 2nd (ed); Hall, E.J, Simpson, J.W and Williams, D.A (ed), BSAVA, Wood house. pp 97-102.

Minami, N. 1990. Investigation of ascites ultrafiltration and reinfusion in the ascitic dog. JPn. J. Vet. Res., 38:64.

Narwan, H., Demes, M., Kovac, A. and Danninger, F. 2000. Treatment of ascites with reinfusion of ascitic fluid concentrate. *Bratisl Lek Listy*, 101(5):306-9.

Nelson, R.W. and Couto, C.G. (1998). Hepatobiliary diseases in the dog. In: *Small Animal Internal Medicine*, 2nd edi. Mosby, Maryland Heights, Mo, USA. pp 529-539.

Richter, K.P. (2003). Disease of the liver and hepato biliary system. In: Hand book of small animal gastroenterology, 2nd (edi), Jam, T.R (eds). St. Louish, Missouri, pp 379 – 381.

Rossaro, L., Graziotto, A., Bonato, S., Plebani, M., Van Thiel, D.H., Burlina, A., Naccarato, R. and Salvagnini, M. 1993. Concentrated Ascitic Fluid Reinfusion after Cascade Filtration in Tense Ascites. *Digestive Diseases and Sciences*, 38(5):903-908.

Salerno, F., Guevara, M., Bernardi, M., Moreau, R., Wong, F., Angeli, P., Garcia-Tsao, G. and Lee, S.S. 2010. Refractory ascites; pathogenesis, definition and therapy of a severe complication in patients with cirrhosis. *Liver international*,937-947.

Saravanan, M., Sarma, K., Kumar, M., Vijaykumar, H. and Mondal, D.B. (2012). Analysis of Serum Ascites Albumin Gradient Test in Ascitic Dogs. *Vet World.*, 5(5): 285-287.

Tennant, B.C and Center, S.A. (2008). Hepatic function. In: Clinical biochemistry of domestic animals, 6th (Eds), Kaneko, J.J., Harvey, J.W and Bruss, M.L, Elsevier Publication, pp 379- 412.

Watson, P.J and Bunch, S.E. (2009). Clinical manifestation of hepatobiliary disease. In: Small animal internal medicine 4th (Eds), Nelson, R.W and Corto, C.G. Mosby, Elsevier, pp485-495.

Webster, C.R.L. (2005). History, Clinical signs and physical findings in hepato biliary disease. In Textbook of veterinary internal medicine. Diseases of the dog and cat. Vol. II 15 ed. Ettinger, S.J and Feldman, E.C, Elsevier Saunders publication, pp 1422- 1434.

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