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## Medical management of septic peritonitis in a dog

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### Abstract

Four years old male non-descript dog was brought with history of anorexia, vomiting, abdominal distension and fever (40.2 °C), congested mucous membrane, tachycardia (168/min) and tachypnoea (88/min) on clinical examination. Haematological examination showed leucocytosis, neutrophilia and moderate anaemia. Serum biochemistry revealed elevated alanine aminotransferase, blood urea nitrogen and creatinine and reduced total protein and albumin. Abdominal ultrasound examination showed free fluid with more cellularity in peritoneal cavity. Around 600 ml of brownish in colour, viscid foul-smelling peritoneal fluid was removed by peritoneocentesis. Increased total cell count, alkaline pH, increased protein and specific gravity and sheet of neutrophils on sediment examination were observed in peritoneal fluid. Cultural examination of peritoneal fluid showed growth of *Escherichia coli*. Difference in glucose level of serum and peritoneal fluid was more than 20 mg /dl indicating septic peritonitis. Metronidazole 500 mg mixed with normal saline was irrigated in to peritoneal cavity for three days. The animal was treated with amoxicillin+clavulanic acid @ 12.5 mg/kg bid iv, furosemide @ 2 mg/kg bid iv, dextrose normal saline @ 10 ml/kg iv and ringer's lactate @ 10 ml/kg iv for seven days. Liver tonics and haematinics were given. The animal showed uneventful recovery after treatment.

**Keywords:** septic peritonitis, dog, ultrasonography, peritoneocentesis

### Introduction

Septic peritonitis is an inflammatory condition of the peritoneal cavity caused by a bacterial infection or chemical contamination which often results in an accumulation of exudate in the abdomen (Kirby, 2003) [1]. It is classified into localized or diffuse and primary, secondary or tertiary. Primary septic peritonitis is mainly due to spontaneous infection of peritoneal cavity which is monomicrobial with gram-positive bacteria. Secondary septic peritonitis is due to consequences of an underlying primary disease process which most common peritonitis in dogs and is polymicrobial (Mueller *et al.*, 2001) [2]. There are many causes of secondary peritonitis; leakage of gastrointestinal contents by penetrating foreign bodies, perforating gastric ulcers, ischemic intestinal injury, rupture of internal organs (stomach, liver, spleen, etc.), rupture of intraabdominal abscess in various organs, blunt abdominal trauma and penetrating abdominal wounds (Costello *et al.*, 2001; Odonez and Puyana, 2006; Bentley *et al.*, 2007) [3, 4, 5]. In the present study, septic peritonitis in a non-descript dog due to blunt abdominal trauma by fighting with another dog is presented.

### Materials and Methods

Four years old male non-descript dog weighing about 17.6 kg was presented to Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli with the fighting with another dog one week back and subsequent anorexia, vomiting, abdominal distension. Clinical examination, haematology, serum biochemistry and radiography of abdomen and thorax were done. Echocardiography using 3.5 MHz cardiac probe on right parasternal view and abdominal ultrasonography using 7.5 MHz linear probe were performed by using MyLab40Vet Doppler colour flow ultrasound machine. Peritoneocentesis (four quadrant technique) was performed using 20 G scalp vein set. Cytological evaluation (total cells, pH, specific gravity, protein, sediment examination), glucose estimation and cultural evaluation of peritoneal fluid were performed. The animal was treated for septic peritonitis with fluids, antibiotics, anti-ulcer drugs, diuretics, liver tonics and haematinics.

### Results and Discussion

Four years old male non-descript dog was depressed and showed bilateral abdominal distention (Fig 1), fever (40.2 °C), congested mucous membrane, tachycardia (168/min) and tachypnoea (88/min) after fighting with another dog one week back. Similar clinical signs

were recorded in a Great Dane dog with peritonitis (Sasikala *et al.*, 2018) [6]. Dog with sepsis was having high temperature and heart rate (Hauptman *et al.*, 1997) [7].

Haematological examination showed leucocytosis (36,000/cumm), neutrophilia (94 %) and moderate anaemia [haemoglobin (8.9 g/dl); packed cell volume (23 %); red blood cell count ( $3.4 \times 10^6$ /cumm)]. Leucocytosis and neutrophilia in dogs with peritonitis were reported (Hauptman *et al.*, 1997; Sasikala *et al.*, 2018) [7, 6]. Serum biochemistry revealed elevated alanine aminotransferase (164 U/L), blood urea nitrogen (56 mg/ dl) and creatinine (1.8 mg/dl) and reduced total protein (6.1 g/dl) and albumin (2.5 g/dl). Moderate anaemia, low protein level and elevated serum ALT, BUN and creatinine might be due to sepsis with the involvement of multi organ dysfunction. Peritonitis was leading to multi organ dysfunction syndrome (MODS) in humans (Kiby, 2003) [1]. Sasikala *et al.* (2018) [6] also found elevated BUN, creatinine in a dog with peritonitis. Glucose level of serum and peritoneal fluid were 128 mg/dl and 48 mg/dl, respectively. The peripheral glucose concentration more than 20 mg/dl higher than abdominal fluid glucose was indicating septic peritonitis (Bonczynski *et al.*, 2003) [8]. Radiography revealed ground glass appearance of abdomen. Echocardiography showed normal cardiac chamber size, wall thickness and cardiac output (Ejection fraction 64 % & Fractional shortening 35 %) which indicated that there was no cardiac involvement for the effusion in abdominal cavity. Abdominal ultrasound examination showed extensive free fluid with more cellularity which looked like star speckled appearance in the peritoneal cavity (Fig 2). Liver, gallbladder, kidney, urinary bladder, spleen, intestine, stomach and prostate showed normal sonological findings. Abdominal ultrasound is more sensitive than radiography for detecting free fluid in the abdomen (Boysen *et al.*, 2004) [9]. Around 600 ml (34 ml/kg bwt) of brownish in colour, viscid foul-smelling peritoneal fluid was removed by peritoneocentesis (Fig 3). Kirby (2003) [1] reported peritoneal effusion volume of 10 ml/kg in 80 % of peritonitis cases. Peritoneal fluid analysis revealed increased total cell count ( $6 \times 10^3$ /cumm), alkaline pH (7.5), increased protein (3.6 g/dl) and specific gravity (1.038) and sheet of neutrophils on sediment

examination by Giemsa stain (Fig 4). Similar cytological findings in the peritoneal fluid analysis of dog with peritonitis (Connally, 2003) [10]. Cultural examination of peritoneal fluid showed growth of *Escherichia coli* and showed sensitivity to amoxicillin + clavulanic acid, enrofloxacin and gentamicin on antibiotic sensitivity testing. The most common pathogenic bacteria isolated in dogs with septic peritonitis were *Escherichia coli*, *Bacteroides spp*, *Clostridium spp*, *Klebsiella spp*, and *Enterococcus spp*. (Mueller *et al.*, 2001; Lanz *et al.*, 2001; Odonez and Puyana, 2006) [2, 11, 4]. The accumulation of peritoneal fluid (exudate) negatively affects healing processes because it decreases the ability to opsonize bacteria for phagocytosis, interferes with the migration of leukocytes and provides a substrate for bacterial growth (Kirby 2003) [1]. Metronidazole 500 mg mixed with normal saline was irrigated to peritoneal cavity for three consecutive days and drained out. The animal was treated with amoxicillin + clavulanic acid @ 12.5 mg/kg bid iv, furosemide @ 2 mg/kg bid iv, dextrose normal saline @ 10 ml/kg iv and ringer's lactate @ 10 ml/kg iv for seven days. Liver tonics and haematinics were also prescribed. The animal showed gradual improvement from third day onwards and recovered completely by seventh day (Fig 6). The abdomen distension reduced completely and ultrasonography of abdomen was normal.



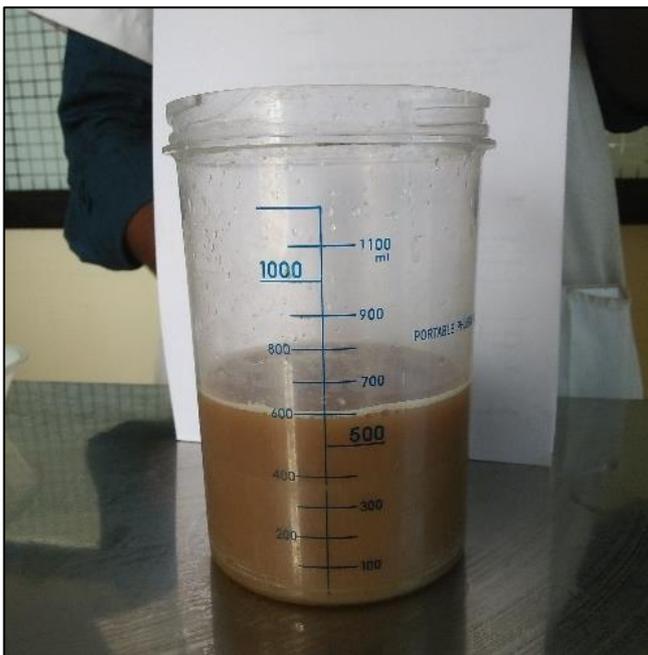
Fig 1: Bilateral abdomen distention in dog



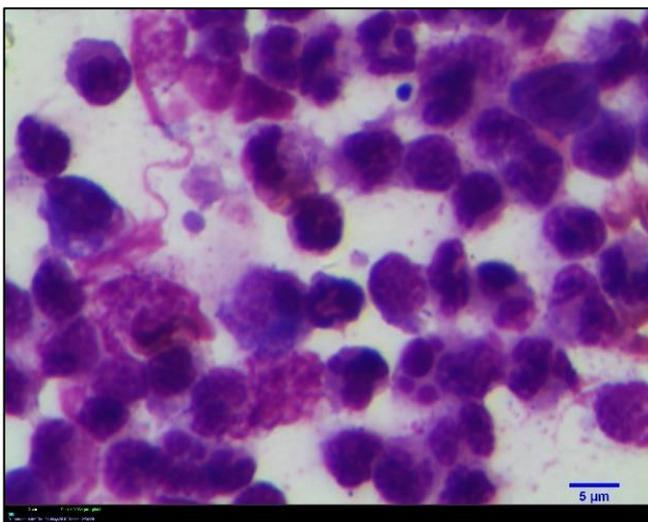
Fig 2: Transabdominal ultrasound scan - showed free peritoneal fluid with increased cellularity



**Fig 3:** Peritoneocentesis using 20 G scalp vein set



**Fig 4:** Peritoneal fluid around 600 ml



**Fig 5:** Cytology of peritoneal fluid showed sheet of neutrophils (100x)



**Fig 6:** Dog after complete recovery

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