Protein losing enteropathy in dogs pdf

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Protein-losing enteropathy (PLE) is encountered in several gastrointestinal (GI) diseases in both the dog and the cat, though it is less common in cats than dogs. The condition varies in severity from mild to severe, with life-threatening complications such as pulmonary thromboembolism. The syndrome occurs when loss of plasma protein through the GI tract exceeds that of protein synthesis and results in hypoproteinaemia. Plasma proteins such as albumin and globulin are essential for maintenance of plasma oncotic pressure. Oncotic pressure draws extracellular fluid forced out of the vascular space by hydrostatic pressure at the arterial end of the capillary network, back into the venous space. Alteration in oncotic or hydrostatic pressure can result in alteration of fluid balance between vascular and extravascular compartments and the development of ascites (see Figure 1), oedema and pleural effusion. A careful, problem-oriented approach to investigation allows accurate diagnosis and tailored management of treatment and prognosis. FIGURE 1 Ascitic dog with a large pendulous abdomen. A fluid wave will be felt on ballottement (credit: Simon Swift) Aetiology Causes of PLE are shown in Table 1. Most commonly encountered causes in canine practice are idiopathic inflammatory bowel, lymphangectasia (primary or secondary) and lymphosarcoma. GI lymphosarcoma is the most common feline cause. In juveniles, endoparasites should always be considered. Clinical presentation PLE is likely to present with symptoms of chronic gastrointestinal disease, the exception being acute presentation of GI intussusception or obstruction. Diarrhoea, vomiting, melaena, haematemesis and weight loss associated with panhypoproteinaemia are the classical signs of the condition with or without ascites. The development of ascites is far less common in the cat than the dog. Not all cases of PLE will present classically; lymphangectasia patients, for example, often present with ascites alone. Diagnosis of PLE Diagnosis of PLE requires that the clinician establish that protein loss is from the gut and then pinpoint the disease causing gut damage. Laboratory work Serum biochemistry often reveals a panhypoproteinaemia with a decrease in both albumin and globulin. However, certain conditions such as lymphoma can produce a globulin increase high enough to produce a normal total protein. Other differentials of low plasma protein include protein-losing nephropathy (PLN) and failure of hepatic protein production. Biochemistry screens should include a full liver profile of ALT, ALP, GGT, AST and bilirubin if possible, with glucose and cholesterol, both of which may be low in chronic liver disease. Hypocholesterolaemia is often seen in PLE, as opposed to PLN where it may be high. Renal parameters, urea and creatinine should be examined, combined with examination of a urine sample collected by cystocentesis. If protein is noted in the urine observation of a number of leucocytes, sediment, culture and a protein creatinine ratio should be performed to assess the relevance of this to the patient's panhypoproteinaemia. An active sediment may indicate a urinary tract infection, but a significant increase in protein creatinine ratio (normal is below 0.5) would suggest that the observation of low total plasma protein is due to a glomerulonephropathy. Abdominocentesis and fluid analysis A sample of any ascitic or pleural fluid should be taken, ideally under ultrasound guidance as it is safer and increases the likelihood of achieving a sufficient sample in smaller effusions. The site for single abdominocentesis is approximately 1cm lateral and to the right of the ventral midline, 1-2cm caudal to the umbilicus. The area is prepared aseptically. For a dog, a 21G, 1 to 1.5-inch Fluid should be submitted to the laboratory for analysis, but a large amount of information can be gained by microscopy, measurement of protein content by refractometer and in-house biochemical analysis hypodermic needle should be used to collect fluid, or a 23G, three-quarter-inch needle for a cat. The fluid should be allowed to drain freely. Samples of fluid are collected into EDTA for cytology, a plain tube for protein and biochemical analysis, and a sterile tube for bacteriological culture. Abdominocentesis is a difficult procedure when performed blind; potential complications include organ perforation and bleeding. Pleural fluid should be collected aseptically if present. Thoracocentesis is usually performed at the seventh and eighth intercostal space unless radiography or ultrasound imaging suggest otherwise. The needle is placed in the dorsal third of the thorax. Either a butterfly needle or over-the-needle catheter can be used. A three-way tap is attached and fluid sample collected. Potential complications include lung laceration, pneumothorax, pyothorax and haemorrhage. Fluid should be submitted to the laboratory for analysis, but a large amount of information can be gained by microscopy, measurement of protein content by refractometer and in-house biochemical analysis. The make-up of the different types of abdominal fluids are listed in Table 2. The most common effusion in PLE is a transudate. A modified transudate may be present if the effusion has been present for a while, resulting in reactive change in the peritoneum. If bacteria and characteristics of an exudate are seen, this may indicate gut perforation in PLE. A highly fibrinous proteinaceous ascitic fluid in a cat would prompt consideration of FIP and coronavirus titres, in association with alpha 1 antiglobulins, albumin and globulin ratios, should be pursued. Faecal analysis Full faecal analysis with culture for Salmonella, Campylobacter spp. should be undertaken. This can be especially important in puppies where heavy worm burdens can result in gut damage and protein-losing enteropathy. Isolation from Campylobacter spp. is of uncertain diagnostic significance as similar numbers have been isolated from healthy and diarrhoeic dogs. Investigation of GI disease should not stop with the detection of Campylobacter spp., although due to the zoonotic potential it should be treated. Virus testing All cats with suspected PLE should be tested for FeLV and FIV before more invasive diagnostics are undertaken. Radiography Survey abdominal radiographs are of little help in animals with suspected PLE due to the loss of abdominal contrast when ascites are present; the exception being acute obstruction of the GI tract by a radio-dense foreign body. Thoracic films may show the presence of a pleural effusion and/or metastatic neoplasia. FIGURE 2a Ultrasonographic image representing the small intestine with marked muscularis thickening (credit: J. Shimali) Ultrasonography Ultrasonography is more useful than radiography in abdominal PLE investigation. Certain conditions have characteristic ultrasonographic changes, for example intussusception, where multiple concentric rings, like an onion, are seen. Evidence of obstruction may be seen as dilated fluid-filled loops of bowel. The structure of gut wall, lymph nodes, presence of effusion and liver architecture should all be observed. Five ultrasonographic gut wall layers are seen. These represent the mucosa, submucosa, muscularis propria and subserosa-serosa FIGURE 2c Ultrasonographic image representing small intestinal eccentric wall thickening with loss of wall layering (credit: J. Shimali) FIGURE 2b longitudinal ultrasonographic image representing marked muscularis thickening (credit: J. Shimali) Mucosa and muscularis propria are hypoechoic, whereas mucosal surface, submucosa and subserosaserosa are hyperechoic. The ultrasonographer can assess wall thickness or disruption in these layers, perhaps indicating inflammatory or invasive neoplastic disease (see Figures 2a to 2c). The localisation of any changes is important as it guides the decision to take endoscopic versus surgical biopsies. Any jejunal lesion is beyond the reach of an endoscope and would indicate surgical biopsy; more generalised disease makes endoscopy appropriate. Evidence of lymphadenopathy is important, and ultrasound can be used to guide fine needle aspiration of nodes to aid in a differentiation of lymphoma and reactive changes. Ultrasound can guide collection of ascitic fluid, especially where the effusion is small. In addition, lacteal dilation may be represented by bright striations within the small intestinal mucosal wall (Figure 3). FIGURE 3 Bright striations within the small intestine in a patient with lymphangectasia (credit: J. Shimali) Endoscopy and gastrointestinal biopsy Definitive diagnosis of PLE in dogs and cats requires intestinal biopsy. Endoscopy is the modality of choice for obtaining small intestinal and gastric biopsies where appropriate. It is minimally invasive, carries a minimal risk of gut perforation and allows the collection of multiple biopsies. If indicated, steroids can be started for treatment soon after the procedure without waiting for healing of surgical wounds. Upper GI endoscopy allows inspection of the mucosa of oesophagus, stomach and duodenum (Figures 4a to 4c). In PLE, changes encountered in the duodenum may include cobbling or roughening of the mucosa (Figure 4c). If lymphangiectasia, either primary or secondary, is present then prominent dilated lacteals are seen (Figure 5) and lymph may leak from these on biopsy, producing a milky fluid. The upper GI tract should be explored for the presence of masses and all areas of the stomach, including a retroflexed view of the cardia, should be examined. Biopsies should always be taken, as a diagnosis cannot be made on observation alone. FIGURE 4a Appearance of the oesophagus on endoscopy FIGURE 4b Endoscopic image of the stomach at the incisura The disadvantages of endoscopy are the requirement for expensive equipment and technical demands. Examination of the stomach and duodenum are possible, as well as of the proximal jejunum in small dogs and cats and the distal ileum in larger dogs via colonoscopy. Laparotomy and surgical biopsy allow the collection of large full-thickness biopsies; however, there is a risk of poor wound healing and dehiscence of the enterotomy sites. Where observed lesions are beyond the reach of endoscopy or are thought on ultrasonography to be submucosal, this is the modality of choice. Published mortality risk for full-thickness small intestinal biopsy is not insignificant and clients should be fully informed. FIGURE 4c Endoscopic image of the duodenum representing a cobbled appearance with inflammation and oedema Biopsies are sent for histopathology and a WSAVA-recommended grading system for IBD is in place. Immunochemistry for differentiation of B and T cell lymphoma, and assessment of T cell clonality by PCR analysis of T cell receptor gamma gene re-arrangement is improving accuracy of diagnosis of intestinal lymphoma. FIGURE 5 Endoscopic image of prominent lacteals within the small intestine Summary PLE is associated with a number of GI conditions in dogs and cats. Accurately characterising the syndrome and pursuing an underlying diagnosis allows tailored therapy and more accurate prognosis for pet and owner. Careful consideration of potential side-effects of the condition, such as thromboembolism and malnutrition, combined with good nursing are instrumental in optimising individual patient outcome.

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