UPDATE ON GASTROINTESTINAL IMAGING

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Over the last 10 years great advances in veterinary abdominal imaging have enabled better investigation of the gastrointestinal tract. The ultrasound equipment has become more performing and affordable, and abdominal ultrasound has become an essential tool to examine small animals with gastrointestinal disease.

Ultrasound is considered an excellent method for diagnosing small intestinal foreign bodies (FBs) and for differentiating between mechanical and functional ileus. When available, it has eliminated the need for gastrointestinal contrast radiography. Ultrasound is particularly useful to exclude the presence of an obstructive process. Luminal dilatation resulting in jejunal diameter of more than 1.5cm has been suggested as a useful indicator for presence of small intestinal obstruction in dogs. When dilatation is observed, a very thorough search for a possible cause of obstruction should be undertaken. Foreign bodies on ultrasound are characterised by variable degrees of distal acoustic shadow and surface reflection; these are dependent on the nature of the material. It is important to consider that some FBs are not very reflective and do not cause a strong acoustic shadow as they may have ultrasound propagation characteristics similar to soft tissue. Radiographic diagnosis of intestinal FBs is challenging when the FB in not visible and is not causing obvious intestinal distension. Partial intestinal obstruction, recent obstruction and duodenal obstruction may present without obvious radiographic signs of intestinal dilatation. In case of duodenal obstruction, the duodenum is dilated but the dilatation is not clearly identified on the radiographs because the duodenum contains only soft tissue/fluid material and no gas. The absence of gas in the dilated loop of intestine decreases the chances to confidently diagnose obstruction on the basis of radiography alone (except when the FB is radiographically obvious). Linear FBs are readily identified in ultrasound and present with a typical plicated appearance of the intestine with or without ultrasonographically visible intraluminal foreign body.

Intestinal intussusception is easily diagnosed on ultrasound; whereby a portion of bowel can be visualised telescoping into adjacent bowel. The resultant typical appearance is of multiple concentric
layers when viewed in transverse section. Intussusception in cats is more frequently associated with an underlying intestinal neoplasia compared to dogs who seem more likely to have an underlying inflammatory disease.

In some cases of gastrointestinal disease, the diagnostic utility of abdominal ultrasound over other diagnostic test (such as endoscopy) is debated. Investigation of the stomach is challenging due to its subcostal position (particularly in deep chested dogs) and to the frequent presence of intraluminal gas. According to a recent study, in dogs presenting with chronic vomiting the contribution of abdominal ultrasound was high only in 27% of the cases; ultrasound was more likely to be of diagnostic utility in older patients, patients presenting with weight loss and patients presenting with a greater number of vomiting episodes. Ultrasound was of better diagnostic utility in dogs with gastrointestinal lymphoma or gastric adenocarcinoma compared with dogs that had gastritis, inflammatory bowel disease (IBD), or gastritis and IBD.

In dogs, measurement of the intestinal wall thickness by ultrasound is neither specific nor sensitive for diagnosing IBD. Mucosal echogenicity seems to be a better parameter to assess in the investigation of chronic enteropathies. A normal hypoechoic mucosa in dogs with chronic diarrhoea is associated with a diagnosis of food-responsive disease (sensitivity of 80% and specificity of 81%). A finding of hyperechoic mucosal striation in dogs is suggestive of protein-losing enteropathy (sensitivity of 75% and specificity of 96%). Hyperechoic mucosal speckles are more frequently associated to, but non-specific, for diagnosing IBD. The ultrasound findings are not a good indicator of clinical remission and in most of the cases the appearance of the intestinal mucosa remains static. The suggested cut off point for normal jejunal lymph node is 6 mm maximal thickness. However lymph node size does not seem to be related to the type of inflammatory disease present and is not a useful tool to monitor therapy efficacy.

Evidence of loss of layering is an excellent predictive factor in differentiating enteritis from intestinal neoplasia in dogs. Neoplastic infiltration is more often focal and shows more severe thickening compared with inflammatory disease. The appearance of the regional lymph nodes can also help when trying to differentiate between neoplastic of inflammatory lesions. Round, enlarged and
hypoechoic lymph nodes are more likely metastatic. Inflammatory lymph nodes can be enlarged but generally they maintain their normal shape. Necrosis and haemorrhage can cause lymph-nodal mixed echogenicity and irregular outline. Fungal infections in endemic regions are difficult to differentiate from neoplastic lesions. Intestinal biopsies are necessary to reach a final diagnosis. Ultrasound guided fine needle aspirates of lymphoma often result in a diagnostic sample.

According to recent literature, thickening of the muscularis propria seems to be seen more often in cats with lymphoma than in cats with normal small intestine or in cats with inflammatory bowel disease. Having been reported also in cats with eosinophilic enteritis, this sign alone cannot be reliably used to make a final diagnosis and a differential list should be formulated.

Feline pancreatitis has been recognised as a significant disease only in recent years. An association between feline IBD, pancreatitis and hepatic disease (termed “triaditis”) has been described; however it is difficult to prove due to the limitation of the diagnostic test available for these diseases.

Ultrasonography is not a very sensitive diagnostic tool for pancreatitis in cats (11-35%), but it is very specific once changes are present. Typical ultrasonographic findings of pancreatitis are an enlarged, hypoechoic pancreas, with or without cavitory lesions, surrounded by hyperechoic mesenteric fat. Associated findings may be dilatation of the common bile duct and peritoneal fluid (sometimes only localised to the pancreatic region). When measuring the common bile duct, it should be taken into consideration that a great variability of common bile duct size has been described in cats, with a normal upper limit size at 4mm. In most cats with cholangitis the liver and biliary system appears normal on ultrasound examination. Signs associated with cholangitis include hyperechoic liver parenchyma, hyperechoic gallbladder content, and increased pancreatic size. In case of extrahepatic biliary obstruction, ultrasound is an efficient tool to visualise if there is an obstructive cholelith (calculus or plug). However, according to a recent study, ultrasound was not able to differentiate between extrahepatic obstructions due to neoplastic versus inflammatory cause. Gall bladder dilatation was visible in less than 50% of the obstructed cases.

Compared to ultrasound, contrast computed tomography has the inconvenience of requiring general anaesthesia; therefore is not the first imaging technique of choice to investigate severely ill patients. Abdominal ultrasound can be challenging and inconclusive in very large or obese patients, or when the lesion is hidden by gas or bone. Contrast computed tomography is often very helpful in these
cases and add valuable information. Contrast computed tomography has been used in conjunction to ultrasound to evaluate necrotising acute pancreatitis. The decision whether or not to use contrast computed tomography is taken on a cases by cases basis, may be in the future this technique will be used routinely for some specific diseases.

Further reading