Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 06, Issue: 05 (SEP-OCT, 2026)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Role of Ultrasonography in the Diagnosis of Gastrointestinal Disorders in Dogs

*Antra Ken[1], Aditya Pratap[2] and Sangeet Rana[1]
[1]Assistant Professor, Department of Veterinary Surgery and Radiology. M. R. Veterinary College & Research Center, Jhajjar, Haryana, India
[2]Assistant Professor, Department of Veterinary Medicine, M. R. Veterinary College & Research Center, Jhajjar, Haryana, India
*Corresponding Author's email: jnvk.antraken28@gmail.com

Gastrointestinal (GI) disorders are among the common clinical problems encountered in dogs, presenting with signs such as vomiting, diarrhoea, anorexia, abdominal pain, weight loss and altered defecation. Early and accurate diagnosis is essential for appropriate treatment and improved patient outcomes. Ultrasonography has emerged as an important, non-invasive diagnostic imaging technique in veterinary practice because it provides real-time information about gastrointestinal wall thickness, layering, motility, luminal contents and surrounding abdominal structures. It plays a valuable role in identifying foreign body obstruction, intussusception, inflammatory bowel disorders, gastrointestinal masses, pyloric abnormalities and other abdominal conditions. Doppler ultrasonography further assists in evaluating vascularity and blood flow in selected cases. This article highlights the principles, clinical applications, characteristic sonographic findings, advantages and limitations of ultrasonography in the diagnosis of gastrointestinal disorders in dogs.

Introduction

Gastrointestinal disorders are frequently encountered in small animal clinical practice and may range from mild, self-limiting digestive disturbances to life-threatening conditions requiring emergency surgical intervention. Dogs commonly present with vomiting, diarrhoea, anorexia, abdominal distension, abdominal pain, dehydration and progressive weight loss. Although clinical examination and laboratory investigations provide valuable information, they may not always identify the underlying cause of gastrointestinal disease. Diagnostic imaging plays an important role in the evaluation of these patients. Radiography is useful for detecting gastrointestinal gas patterns, radiopaque foreign bodies and abnormal organ displacement. However, ultrasonography provides additional information about gastrointestinal wall architecture, motility, luminal contents and adjacent abdominal organs without exposing the patient to ionizing radiation. Ultrasonography is particularly useful because it allows real-time examination of the stomach and intestinal tract. It can help differentiate mechanical obstruction from certain non-obstructive conditions and identify lesions that may require medical management, endoscopic evaluation or surgical intervention. Nevertheless, sonographic findings must always be interpreted alongside clinical signs, laboratory results and other diagnostic investigations.

Principles of Gastrointestinal Ultrasonography

Ultrasonography uses high-frequency sound waves to produce images of internal organs. The reflected sound waves are converted into images that help evaluate the structure and function of the gastrointestinal tract. A systematic abdominal ultrasound examination generally includes the stomach, pyloroduodenal junction, duodenum, jejunum, ileum, ileocolic junction and colon. The liver, pancreas, mesentery, abdominal lymph nodes and peritoneal cavity should

also be assessed because abnormalities in these structures may accompany gastrointestinal disease. A high-frequency linear transducer is commonly useful for evaluating superficial abdominal structures and intestinal wall layering. A microconvex or curvilinear transducer may be helpful for examining deeper abdominal structures, depending on the size of the dog and the clinical situation. Proper patient positioning, adequate coupling gel, suitable transducer selection and systematic scanning improve image quality. Clipping the abdominal hair is generally recommended. Fasting may improve assessment of the stomach in stable patients; however, emergency imaging should not be unnecessarily delayed when obstruction or another serious abdominal condition is suspected.

Normal Ultrasonographic Appearance of the Gastrointestinal Tract

The normal gastrointestinal wall typically demonstrates five alternating echogenic layers:

- **Mucosal interface:** Echogenic inner luminal boundary.
- **Mucosa:** Generally hypoechoic.
- **Submucosa:** Relatively hyperechoic.
- **Muscularis:** Relatively hypoechoic.
- **Serosa:** Thin, hyperechoic outer boundary.

The thickness and visibility of these layers vary according to the gastrointestinal segment, body size, age, degree of distension and scanning technique. Consequently, measurements should be interpreted using appropriate reference values rather than a single universal cutoff. Normal intestinal motility produces coordinated peristaltic movements. The lumen may contain fluid, gas or ingesta, which can influence image quality. Gas may produce reverberation and acoustic shadowing, limiting visualization of deeper structures. Preservation of normal wall layering is an important finding during examination, although it does not exclude every gastrointestinal disorder.

Role of Ultrasonography in Different Gastrointestinal Disorders

1. Gastrointestinal Foreign Body and Intestinal Obstruction

Foreign body ingestion is an important cause of mechanical gastrointestinal obstruction in dogs, particularly in young animals. Commonly encountered materials include toys, bones, cloth, rubber objects and linear materials.

Ultrasonographic findings may include:

- Direct visualization of an intraluminal foreign body.
- Segmental intestinal dilatation proximal to the obstruction.
- Accumulation of fluid and ingesta within the intestinal lumen.
- Abnormal or reduced peristaltic activity.
- Plication of intestinal loops in selected cases involving linear foreign bodies.
- Changes in intestinal wall thickness and layering when inflammation or injury develops.

A foreign body may appear hyperechoic and produce distal acoustic shadowing, although its appearance varies according to its composition. The transition between dilated and relatively empty intestinal segments may help identify the site of obstruction. Ultrasonography is particularly valuable for assessing the surrounding mesentery, regional effusion and possible complications. However, gas, patient movement and the location of the foreign body may interfere with visualization. Radiography and ultrasonography can therefore complement each other during diagnostic evaluation.

2. Intussusception

Intussusception occurs when one segment of the intestine invaginates into an adjacent segment. It may cause intestinal obstruction, impaired circulation and, in severe cases, intestinal necrosis. Dogs may present with vomiting, abdominal pain, lethargy, diarrhoea or a palpable abdominal mass. The characteristic ultrasonographic appearance is the **target or concentric-ring sign** on transverse scanning. Multiple alternating echogenic and hypoechoic rings represent the superimposed intestinal walls. Longitudinal images may reveal parallel layers of invaginated intestinal segments. Ultrasonography helps identify the lesion, assess its extent and evaluate associated changes in the intestinal wall and surrounding tissues. Doppler examination may

provide additional information about detectable blood flow, although the presence of flow does not independently exclude intestinal compromise.

Early recognition is important because intussusception may require urgent surgical treatment.

3. Gastroenteritis and Inflammatory Bowel Disorders

Gastrointestinal inflammation may result from dietary indiscretion, infectious agents, parasites, adverse food reactions, immune-mediated conditions and other causes. Depending on the severity and distribution of the disease, ultrasonography may reveal:

- Mild or moderate gastrointestinal wall thickening.
- Preserved or altered wall layering.
- Increased or decreased intestinal motility.
- Fluid accumulation within the lumen.
- Increased echogenicity of the surrounding mesentery.
- Enlargement of regional lymph nodes in some cases.

Chronic inflammatory enteropathies may produce variable sonographic changes. Some affected dogs may have nearly normal ultrasound findings, whereas others demonstrate intestinal wall thickening or changes in individual wall layers. Importantly, ultrasonography alone cannot reliably distinguish all inflammatory conditions from neoplastic diseases. Clinical history, faecal examination, laboratory investigations and, when indicated, endoscopic or surgical biopsy may be necessary to establish a definitive diagnosis.

4. Gastrointestinal Neoplasia

Gastrointestinal tumours may affect the stomach, small intestine or large intestine. Clinical signs commonly include persistent vomiting, anorexia, weight loss, gastrointestinal bleeding and abdominal discomfort.

Ultrasonographic abnormalities may include:

- Focal or segmental gastrointestinal wall thickening.
- Loss or disruption of normal wall layering.
- Irregular margins of the affected segment.
- Reduced luminal diameter or associated obstruction.
- Alterations in regional lymph nodes.
- Evidence of abdominal effusion or other abdominal lesions.

Focal wall thickening accompanied by loss of normal layering raises concern for an infiltrative or neoplastic process. However, severe inflammation can produce similar findings. Ultrasonography also facilitates image-guided fine-needle aspiration of suitable lesions or lymph nodes. Histopathological examination remains important when tissue diagnosis is required.

5. Gastric Dilatation and Pyloric Disorders

Ultrasonography can help evaluate gastric contents, wall thickness, pyloric anatomy and selected gastric abnormalities. It may identify abnormal gastric distension, retained contents, focal wall lesions and changes around the pyloroduodenal junction. In suspected gastric outflow obstruction, sonography may demonstrate gastric fluid accumulation, abnormal pyloric appearance or associated proximal intestinal changes. However, the presence of excessive intragastric gas can substantially limit examination. Gastric dilatation-volvulus is a life-threatening emergency. Clinical assessment and radiography are particularly important for rapid diagnosis, and ultrasonography should not delay stabilization or definitive treatment.

6. Colonic Disorders

Ultrasonography is useful for evaluating the colon when suitable acoustic windows are available. It may help identify colonic wall thickening, focal masses, abnormal luminal contents and changes in surrounding tissues. Constipation and obstipation may be associated with colonic distension and retained faecal material, although abdominal radiography is often more useful for assessing the extent of faecal accumulation. Ultrasonography can also assist in investigating suspected colonic neoplasia, inflammatory lesions and regional lymph node abnormalities. Its diagnostic value depends on the lesion location, intestinal contents and image quality.

7. Pancreatic and Peritoneal Abnormalities Associated with Gastrointestinal Signs

Vomiting and abdominal pain may arise from disorders of organs adjacent to the gastrointestinal tract. Pancreatitis, for example, can produce gastrointestinal signs and may be accompanied by hypoechoic pancreatic tissue and increased echogenicity of the surrounding mesentery. Abdominal ultrasonography also helps detect free fluid, changes in mesenteric fat and abnormalities of regional lymph nodes. These findings may provide useful supporting evidence when investigating abdominal inflammation or complications of gastrointestinal disease. Nevertheless, pancreatic and peritoneal sonographic changes are not always specific. Findings must be correlated with clinical examination, pancreatic biomarkers and other relevant investigations.

Role of Doppler Ultrasonography

Doppler ultrasonography provides information about blood flow within detectable vessels and selected lesions. In gastrointestinal cases, it may assist in evaluating vascularity of focal masses, regional vessels and intestinal segments when vascular compromise is suspected. Colour and spectral Doppler techniques can provide supplementary information about blood flow. However, results depend on equipment settings, transducer pressure, patient movement and the size and depth of the vessels. Doppler findings should not be used in isolation to determine intestinal viability. Clinical findings, conventional B-mode imaging and, when required, surgical assessment remain essential.

Advantages of Ultrasonography in Gastrointestinal Diagnosis

The major advantages of gastrointestinal ultrasonography in dogs include:

- Non-invasive examination without ionizing radiation.
- Real-time assessment of gastrointestinal motility.
- Evaluation of wall thickness and preservation of wall layering.
- Detection of many radiolucent foreign bodies.
- Identification of intussusception and selected obstructive lesions.
- Assessment of adjacent abdominal organs, lymph nodes and peritoneal fluid.
- Guidance for selected fine-needle aspiration and biopsy procedures.
- Potential for serial examinations to monitor disease progression or response to treatment.

These advantages make ultrasonography an important component of the diagnostic approach to canine gastrointestinal disease.

Limitations of Gastrointestinal Ultrasonography

Despite its clinical usefulness, ultrasonography has several limitations. Gastrointestinal gas may obscure deeper structures and interfere with complete visualization. Patient movement, obesity, inadequate preparation and operator experience can also affect image quality. Some inflammatory and neoplastic diseases produce overlapping sonographic findings. Early lesions may be subtle, and normal-appearing ultrasound images do not exclude all gastrointestinal disorders. Ultrasonography is also operator-dependent. Accurate interpretation requires knowledge of normal anatomy, appropriate scanning techniques and familiarity with disease-associated changes. For these reasons, ultrasonography should be considered part of an integrated diagnostic approach rather than a replacement for clinical examination, radiography, laboratory testing, endoscopy or histopathology.

Emerging Developments

Advances in veterinary diagnostic imaging continue to improve gastrointestinal assessment. Contrast-enhanced ultrasonography is being investigated for evaluating tissue perfusion and microvascular characteristics. Improved transducer technology, image processing and standardized examination protocols may further enhance the detection and characterization of intestinal lesions. However, advanced imaging techniques require appropriate equipment, training and validation. Their clinical use should be guided by the availability of evidence and the diagnostic requirements of the individual patient.

Conclusion

Ultrasonography is a valuable diagnostic imaging modality for evaluating gastrointestinal disorders in dogs. Its ability to assess gastrointestinal wall architecture, motility, luminal contents and surrounding abdominal structures makes it particularly useful in suspected foreign body obstruction, intussusception, inflammatory disease and gastrointestinal neoplasia. It also assists in identifying associated pancreatic, mesenteric and peritoneal abnormalities. Although ultrasonography provides important diagnostic information, its findings are not always disease-specific. Combining ultrasonography with clinical examination, laboratory investigations and complementary imaging or tissue sampling improves diagnostic confidence. A systematic scanning approach, appropriate interpretation and timely clinical decision-making can contribute significantly to the effective management of canine gastrointestinal disorders.