

ACUTE ABDOMEN IN DOGS & CATS

Step-by-Step Approach to Patient Care

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Acute gastrointestinal (GI) distress and abdominal pain require prompt evaluation and immediate intervention to prevent further morbidity and mortality. The most important question is: *Does the patient require medical or surgical management?* If surgical management is warranted, the clinician will need to time the surgery to decrease further morbidity and maximize survival.

Acute abdominal pain is associated with a variety of underlying causes (Table 1), and results from:

- Stimulation of pain fibers—A-delta and c-nociceptors—within the:
 - » GI tract (ie, submucosa, muscularis or peritoneal lining of hollow viscera)
 - » Abdominal organs (ie, capsule distension and stretching of spleen and liver)
 - » Nerves, muscle, fascia, and skin associated with the abdominal wall.
- Pain referred from extra-abdominal sites.¹

STEP 1. Determine if clinical signs are associated with acute abdominal pain.

Clinical signs associated with acute abdominal pain may include:²

- Restlessness and/or guarding or splinting of the abdomen

- Arched back or “prayer position” (Figure 1)
- Abdominal distension (Figure 2)
- GI signs, including vomiting, diarrhea, hypersalivation, retching, or anorexia
- Poor perfusion parameters, including pale mucous membranes (Figure 3), prolonged capillary refill time, and poor pulse quality
- Tachypnea and/or tachycardia.



Figure 1. Abdominal stretching or the classic “prayer position”

Figure 2. Severe abdominal distension due to ascites

Figure 3. Pale mucous membranes

TABLE 1. Acute Abdominal Pain: Differential Diagnosis List²

Abdominal Lymph Node Disease	<ul style="list-style-type: none"> • Abscessation/infection • Neoplasia
External GI/ Abdominal Structures	<ul style="list-style-type: none"> • Fasciitis • Herniation (umbilical, inguinal, abdominal wall) • Intervertebral disk disease • Myositis • Steatitis
GI Tract Lesions	<ul style="list-style-type: none"> • Gastric dilatation–volvulus • GI neoplasia, obstruction, perforation, or ulceration • Intestinal torsion • Intussusception • Mesenteric thrombosis or torsion • Pyloric outflow obstruction
Pancreatic Disease	<ul style="list-style-type: none"> • Infarction of the pancreas • Pancreatic abscess • Pancreatitis
Peritoneal Cavity Disease	<ul style="list-style-type: none"> • Bile peritonitis • Hemoperitoneum • Pneumoperitoneum • Septic peritonitis • Uroperitoneum
Reproductive Tract Disease	<ul style="list-style-type: none"> • Pyometra • Testicular abscess or torsion • Uterine rupture or torsion
Reticulo-endothelial System	<p>Hepatobiliary Disease</p> <ul style="list-style-type: none"> • Biliary tract rupture, mucocele, or obstruction • Hepatic abscess, hepatitis, or cholangiohepatitis • Liver lobe torsion • Neoplasia <p>Splenic Disease</p> <ul style="list-style-type: none"> • Fracture • Hematoma • Neoplasia • Thrombosis • Torsion
Urinary Tract	<p>Prostatic Disease</p> <ul style="list-style-type: none"> • Prostatic neoplasia • Prostatitis/prostatic abscess <p>Renal Disease</p> <ul style="list-style-type: none"> • Avulsion • Calculi • Infarct • Neoplasia • Pyelonephritis <p>Urethral/Ureteral Disease</p> <ul style="list-style-type: none"> • Obstruction • Passage of calculi • Rupture <p>Urinary Bladder Disease</p> <ul style="list-style-type: none"> • Cystitis • Neoplasia • Obstruction • Rupture

TABLE 2. Patient Status: Examples of Diagnoses & Therapeutic Approach

EXAMPLES OF DIAGNOSES	THERAPEUTIC APPROACH
Nonsurgical	
Acute pancreatitis Gastritis Gastroenteritis	<ul style="list-style-type: none"> • IV fluid therapy • Medications, including analgesics, antiemetics, gastroprotectants, and prokinetics
Emergent	
Cardiovascularly stable hemoabdomen Intestinal obstruction without evidence of peritonitis Uroabdomen, with placement of temporary urinary or peritoneal dialysis catheter	<p>Surgical candidates that can:</p> <ul style="list-style-type: none"> • Tolerate a delay in anesthesia and surgery • Require medical therapy to optimize health status prior to anesthesia and surgery
Critical	
Gastric dilatation–volvulus Mesenteric torsion Septic peritonitis Uncontrolled hemorrhage	<p>Patients that require:</p> <ul style="list-style-type: none"> • Rapid assessment and treatment • Immediate emergency abdominal surgery; delay will increase morbidity and mortality

STEP 2. Categorize patient as nonsurgical, emergent, or critical.

When a patient presents with concern for GI distress and acute abdominal pain, I try to place them into 1 of 3 categories: nonsurgical (medical), emergent, or critical (**Table 2**).

Some cases are fairly straightforward; for example, the 4-year-old standard poodle that presents with acute onset of panting, pacing, nonproductive retching, and distended abdomen. Gastric dilatation–volvulus (GDV) is the most likely diagnosis. However, other cases present with clinical signs consistent with acute abdomen but too vague to identify a specific diagnosis without further evaluation.

Therefore, use your well-tuned examination and diagnostic skills to determine whether patients require a medical or surgical approach.

STEP 3. Perform triage evaluation and address any life-threatening abnormalities.

Triage History

Important triage information includes:³

- Signalment
 - » *Age*: Younger patients may have a different differential list (eg, trauma, poisoning) compared with older patients (eg, neoplasia, metabolic disease)
 - » *Sex*: Intact patients may also have a different differential list (eg, pyometra, prostatic abscess) than that of neutered patients.
 - » *Breed*: Breed variations may help guide examination and

TABLE 3. Physical Examination: Assessment & Findings

VITAL SIGN ASSESSMENT	
Cardiovascular	<ul style="list-style-type: none"> • Capillary refill time • Heart rate/rhythm • Mucous membranes • Pulse quality • Body temperature
Respiratory	<ul style="list-style-type: none"> • Respiratory rate/effort
POTENTIAL FINDINGS	
Abdominal	<ul style="list-style-type: none"> • Ascites • Focal source of abdominal pain • Distended abdomen with tympany on percussion (GDV) • Abdominal mass (possible neoplasia) • Organomegaly
Eyes, Ears, Nose, Throat (EENT)	<ul style="list-style-type: none"> • Dental, ocular, or otic disease • Halitosis • String foreign material under the tongue • Ulceration
Lymph Nodes	<ul style="list-style-type: none"> • Lymph node enlargement or discomfort
Musculo-skeletal/ Neurologic	<ul style="list-style-type: none"> • Fractures • Joint swelling • Muscle atrophy • Referred spinal pain
Skin (Integument)	<ul style="list-style-type: none"> • Ecchymoses/bruising • Hemorrhage in area of umbilicus (Cullen's sign); may indicate hemoabdomen
Respiratory	<ul style="list-style-type: none"> • Bronchovesicular sounds
Rectal	<ul style="list-style-type: none"> • Melena or hematochezia • Peri-anal masses • Prostate pain or enlargement • Sublumbar lymphadenopathy
Urogenital	<ul style="list-style-type: none"> • <i>Females</i>: Pregnancy, mammary masses, or vaginal discharge • <i>Males</i>: Enlarged prostate or preputial discharge

diagnostics, such as a standard poodle with GDV or hypoadrenocorticism versus a dachshund with intervertebral disk disease

- Presenting complaint
- Time of onset
- Progression since initial onset.

Triage Examination

A triage examination is a brief, focused, physical evaluation that is critical to assess major body systems, which include the *cardiovascular* (ie, circulation and tissue perfusion), *neurologic* (ie, brain or spinal cord dysfunction), *respiratory* (ie, airway patency, oxygenation), and *urogenital* (ie, renal function and urinary bladder integrity) systems. Failure to recognize an abnormality in any system can result in immediate, life-threatening deterioration of the patient.

STEP 4. Obtain detailed history and perform thorough physical examination.

Once the initial assessment is completed and any life-threatening abnormalities addressed, obtain a more thorough history and perform a complete physical examination.

Acute Abdomen History

In patients with GI distress and acute abdominal pain, history should address:

- *Medication history* (both prescription and over the counter)
- *Access to foreign material* (indoors and outdoors)
 - » Abnormal/new food
 - » Garbage
 - » Recent abdominal surgery
 - » Toys (both children and pet)
- *Trauma*
- *If vomiting present*, differentiating it from regurgitation, coughing, or retching.
- *If diarrhea present*, characterizing it as large or small bowel based on color, frequency, and consistency and supplementing with rectal examination.

Physical Examination Evaluation

Following the triage examination, perform a thorough physical examination (Table 3).

STEP 5. During history and physical examination, begin monitoring patient.

An effective veterinary team has mastered the art of multitasking. To facilitate efficient patient assessment, ask support staff to:⁴

- Place peripheral IV catheter(s)
- Initiate intermittent or continuous electrocardiography for cardiac monitoring
- Monitor pulse oximetry and blood pressure

TABLE 4. Opioid Medications for Acute Abdomen

Medication	Dose Range	Frequency	Route
Buprenorphine	0.01–0.02 mg/kg	Q 4–6 H	SC, IM, IV
Fentanyl	3–10 mcg/kg/H (2–5 mcg/kg initial IV bolus)	Constant rate infusion	IV
Fentanyl patch	< 10 kg: 25-mcg patch 10–20 kg: 50-mcg patch 20–30 kg: 75-mcg patch > 30 kg: 100-mcg patch	Q 3–4 days; onset of effect 12–24 H after application	Transdermal
Hydromorphone	0.05–0.2 mg/kg	Q 4–6 H	SC, IM, IV
Methadone	0.1–0.4 mg/kg	Q 6 H	SC, IM, IV
Morphine	0.5–2 mg/kg	Q 4–6 H	SC, IM

- Evaluate packed cell volume, total protein, blood glucose, lactate, and electrolytes; determine if azotemia is present.

STEP 6. Initiate primary treatment based on findings.

Based on physical examination and initial diagnostic results, primary treatments may include:

- *IV fluid therapy* to correct hypovolemia and improve perfusion; administer:
 - » Balanced isotonic crystalloids (10–30 mL/kg) in incremental boluses
 - » Synthetic colloids (hydroxyethyl starch, 3–5 mL/kg) in incremental boluses
- *Supplemental oxygen*, if there is labored breathing or abnormal perfusion
- *Analgesic therapy*:⁵
 - » Opioid therapy is most commonly used (Table 4).
 - » Nonsteroidal anti-inflammatory drugs (NSAIDs) should be used with caution until the underlying cause is identified. Their usefulness is limited in hypoperfused patients due to side effects (renal and GI compromise) and potential need for surgery.

STEP 7. Perform secondary survey as well as additional diagnostics.

Laboratory Analysis

- *Complete blood count*: White blood cell, red blood cell, and platelet counts
- *Serum biochemical profile*: Important organ values, blood glucose, and electrolytes
- *Pancreatic testing*: Pancreatic lipase immunoreactivity test, lipase, or amylase can be used to evaluate possible pancreatitis.
- *Coagulation profile*: Prothrombin time, partial thromboplastin time, platelet count, and D-dimers
- *Urinalysis and urine sediment*: Urine specific gravity, presence of bacteria, and other abnormalities
- *Fecal examination*: Fecal float and cytology

Imaging Analysis

Radiography to identify or evaluate (Figures 4 through 6):

- GDV or pneumoperitoneum
- Presence of foreign material or intestinal pattern consistent with obstruction, such as small intestinal plication or dilation (*Note: Distention of bowel up to 1.6× the height of the body of L5 is reportedly normal in dogs.*)
- Poor contrast and detail due to:
 - » Ascites (eg, carcinomatosis)
 - » Lack of abdominal fat (eg, cachectic or juvenile patient)
 - » Mass effect (eg, pyometra or stump pyometra, splenic mass)
 - » Peritonitis (eg, septic effusion due to ruptured intestinal viscera).

Abdominal ultrasound to identify (Figure 7):

- GI obstruction
- Pancreatitis
- Peritoneal effusion
- Pyometra
- Specific organ enlargement
- Urinary tract obstruction.



Figure 4. Gastric dilatation–volvulus

Figure 5. Severe gastric distension due to “food bloat”

Figure 6. Large urinary bladder stones

Figure 7. Ultrasound appearance of small intestinal intussusception

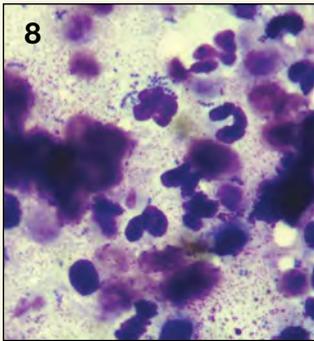


Figure 8. Septic suppurative inflammation diagnosing a septic abdomen

Figure 9. Gross surgical appearance of a small intestinal intussusception

Figure 10. Dehiscence of a small intestinal resection and anastomosis

Cytologic Analysis

Effusion can be obtained by:^{6,7}

- **Abdominocentesis** (ultrasound-guided or 4-quadrant technique)
- **Diagnostic peritoneal lavage** (for small volume effusion or if ultrasound is unavailable).

Cytologic evaluation of the effusion should include (**Figure 8**):

- Identification of degenerate neutrophils, neoplastic cells, and/or intracellular bacteria
- Nucleated cell count and differentiation among transudate, modified transudate, or exudate
- Detection of food material
- Measurement of:^{8,9}
 - » Lactate and glucose (compared to plasma in evaluation of sepsis)
 - » Creatinine and potassium (compared to plasma in evaluation of urinary tract rupture)
 - » Bilirubin (compared to plasma in evaluation of biliary tract rupture).

STEP 8. For emergent and critical patients, consider indications for surgery:

Indications for immediate surgical intervention in critical patients include (**Figures 9 and 10**):

Abdominal Conditions

1. Complete bowel obstruction
2. GDV
3. Inability to medically stabilize intra-abdominal hemorrhage^{10,11}
4. Mesenteric volvulus
5. Penetrating abdominal injury
6. Splenic torsion

Diagnostic Findings

7. Cytologic evidence of intracellular bacteria or plant/food material in abdominal fluid
8. Elevated creatinine and potassium levels compared to peripheral serum levels

9. Elevated bilirubin levels compared to peripheral serum levels

10. Free gas on abdominal radiographs (if radiographs taken prior to abdominocentesis and patient has not had recent abdominal surgery)

Once a diagnosis is made, the critical question is: How soon should surgery be performed? This decision depends on 2 factors:

1. How stable is the patient?
2. What is the underlying diagnosis?

Most patients presenting with an acute abdomen will require some degree of stabilization prior to anesthesia and surgery. For example, in patients with acute abdominal pain and GI distress with hypovolemia, common findings are acid–base or electrolyte abnormalities, which should be addressed prior to anesthetic induction.

Clinical judgment is needed to determine the appropriate balance between presurgical stabilization and the amount of time taken before the problem can be surgically corrected.

TABLE 5. Broad-Spectrum Antibiotic Combinations for Critical Patients

COMBINATION 1

Cefazolin, or Ampicillin	20–30 mg/kg Q 8–12 H; IV 22 mg/kg Q 8 H; IV
Enrofloxacin	10–15 mg/kg Q 24 H; IV
Metronidazole	10 mg/kg Q 12 H; IV

COMBINATION 2

Ampicillin/sulbactam	20–30 mg/kg Q 8 H; IV
Enrofloxacin	10–15 mg/kg Q 24 H; IV
Metronidazole	10 mg/kg Q 12 H; IV

COMBINATION 3

Cefotaxime	30–50 mg/kg Q 6 H; IV
Clindamycin	8–11 mg/kg Q 8–12 H; IV

TABLE 6. GI Protectants & Antiemetic Medications

MEDICATION	DRUG CLASS	DOSE RANGE, FREQUENCY, & ROUTE
Chlorpromazine	Alpha-2 and D2 antagonist	0.1–0.5 mg/kg Q 8 H; IM, SC, suppository
Dolasetron	5-HT3 antagonist	0.5–1 mg/kg Q 12–24 H; SC, IV
Famotidine	H2 receptor antagonist	0.5–1 mg/kg Q 12–24 H; IV, PO, SC
Maropitant	NK-1 antagonist	1 mg/kg Q 24 H; SC 2 mg/kg Q 24 H; PO
Metoclopramide	D2 antagonist	0.2–1 mg/kg Q 6 H; IM, PO, SC 1–2 mg/kg/day ; CRI
Omeprazole	Proton pump inhibitor	0.7–1 mg/kg Q 24 H; IV, PO
Ondansetron	5-HT3 antagonist	0.1–0.3 mg/kg Q 6–24 H; IV, PO
Pantoprazole	Proton pump inhibitor	0.7–1 mg/kg Q 24 H; IV
Prochlorperazine	Alpha-2 and D2 antagonist	0.1–0.5 mg/kg Q 8 H; IM, SC, suppository
Ranitidine	H2 receptor antagonist	Dog: 2 mg/kg Q 8–12 H; IV, PO Cat: 2.5 mg/kg Q 12 H; IV Cat: 3.5 mg/kg Q 12 H; PO

References

1. Franks JN, Howe LM. Evaluating and managing acute abdomen. *Vet Med* 2000; 95(1):56-69.
2. Macintire DK. The acute abdomen—differential diagnosis and management. *Semin Vet Med Surg (Small Anim)* 1988; 3(4):302-310.
3. Kirby R, Rudloff E. Acute abdomen. In Morgan R (ed): *Handbook of Small Animal Practice*, 3rd ed. Philadelphia: WB Saunders, 1997.
4. Mann FA. Acute abdomen: Evaluation and emergency treatment. In Bonagura JD (ed): *Kirk's Current Veterinary Therapy XIII*. Philadelphia: WB Saunders, 2002, pp 160-164.
5. Mathews K. Management of pain. *Vet Clin North Am Small Anim Pract* 2001; 30:4.
6. Crowe DT. Diagnostic abdominal paracentesis and lavage in the evaluation of abdominal injuries in dogs and cats: Clinical and experimental investigations. *JAAHA* 1976; 168:700.
7. Rudloff E. Abdominocentesis and diagnostic peritoneal lavage. In Ettinger S, Feldman E (eds): *Textbook of Veterinary Internal Medicine: Diseases of the Dog and Cat*, 6th ed. St. Louis: Elsevier Saunders, 2005, pp 269-270.
8. Rizzi TE, Cowell RL, Tyler RD, Meinkoth JH. Effusions; abdominal, thoracic, and pericardial fluid. *Diagnostic Cytology and Hematology of the Dog and Cat*, 3rd ed. St. Louis: Mosby, 2008, pp 235-255.
9. Bonczynski JJ, Ludwig LL, Barton LJ, et al. Comparison of peritoneal fluid and peripheral blood pH, bicarbonate, glucose, and lactate concentration as a diagnostic tool for septic peritonitis in dogs and cats. *Vet Surg* 2003; 32:161.
10. Crowe D, Devey J. Assessment and management of the hemorrhaging patient. *Vet Clin North Am Small Anim Pract* 1994; 24:1095.
11. Herold L, Devey J, Kirby R, Rudloff E. Clinical evaluation and management of hemoperitoneum in dogs. *J Vet Emerg Crit Care* 2008; 18(1):40-53.
12. Saxon W. The acute abdomen. *Vet Clin North Am Small Anim Pract* 1994; 24(6):1207-1224.

STEP 9. For all patients, implement appropriate medical therapy.

In addition to fluid therapy, electrolyte correction, and potential surgical correction, other therapies to consider include:

Antibiotic Therapy

Translocation of gram-positive and gram-negative aerobes and anaerobes may occur following a period of poor perfusion and alteration to the integrity of the GI tract. Common broad-spectrum antibiotic combinations I use in critical patients are listed in Table 5.

GI Therapy

For persistent GI upset, administer gastroprotectants and antiemetics (Table 6).

IN SUMMARY

Ultimately, the prognosis for patients with acute abdomen depends on the underlying disease process.¹² Many diseases are treatable with fluid resuscitation, pain control, and exploratory laparotomy. Rapid evaluation and treatment of life-threatening complications, such as hypovolemic shock, decreases morbidity and gives the astute clinician time to determine a diagnosis and develop a therapeutic plan. ■

GDV = gastric dilatation–volvulus; GI = gastrointestinal; NSAID = nonsteroidal anti-inflammatory drug



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