

Gut instincts: Diagnosing and Treating Acute Abdomen Patients

Mezza Luna April 2024

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Objective

- Define Acute Abdomen
- Review patient assessment
- Identify the common causes of acute abdomen
- Discuss diagnostic techniques used to ascertain underlying etiology
- Discuss medical and surgical management of acute abdomen

Acute Abdomen

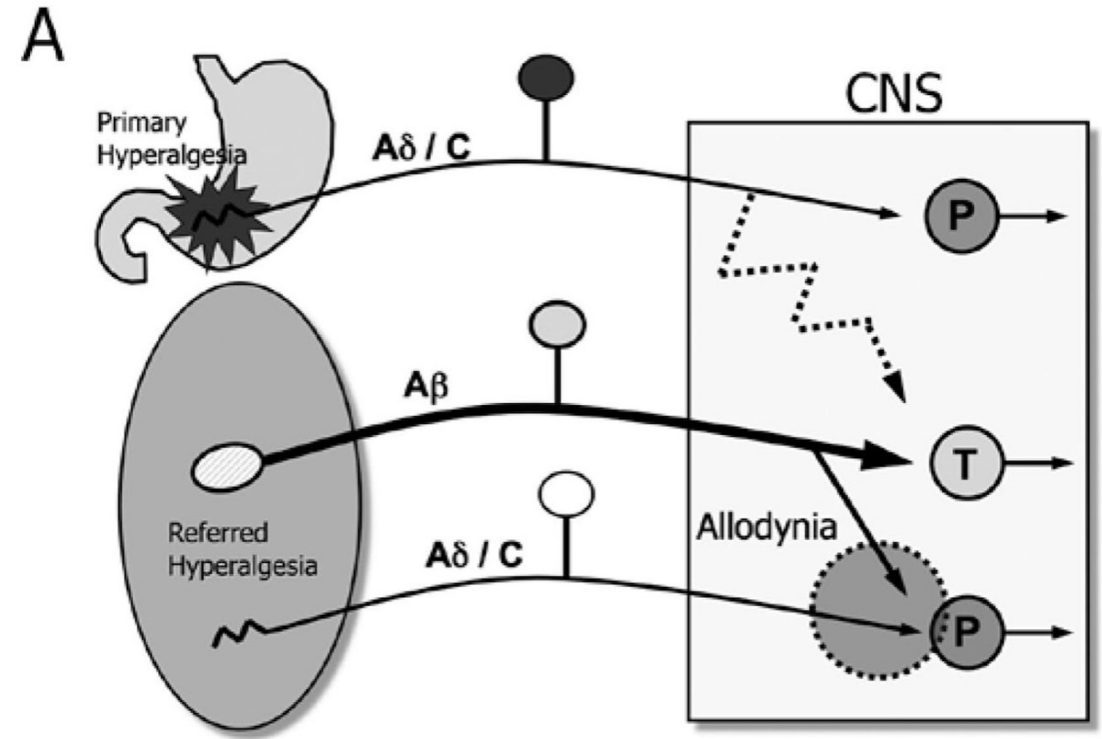
- Multi-etiological clinical syndrome
 - Sudden onset intense abdominal pain (<24 hour)



Today's Veterinary Practice

Sources of Pain

- Intra abdominal
 - A δ and C afferent fibers
 - GI tract
 - Abdominal organs
 - Nerves
 - Muscles
 - Fascia
 - Skin
 - Referred extra-abdominal sites



Cervero

Presentation

- Tense, Painful Abdomen
- Gastrointestinal Signs (Vomiting, Diarrhea)
- Postural changes
 - Arched back or prayer position
- Abdominal stretching/ distension



Today's Veterinary Practice

Triage Exam

- Abdominal stretching/ distension
- Tachypnea or tachycardia
- Pale mucous membrane
- Prolong CRT
- Poor pulses



Today's Veterinary Practice

History

- Signalment
 - Age
 - Sex
 - Breed
- Presenting complaint
- Time of onset
- Progression



History: Age

- Young

- Foreign material
- GI obstruction
- Parvo
- Intussusception
- Parasite
- Trauma
- AHDS/ HGE

- Older

- Neoplasia
- Hemorrhage



History: Breed

- Young German Shepherd
 - mesenteric volvulus
- Schnauzer
 - Pancreatitis
- Deep Chested dog
 - GDV

History: Specific Questions

- Toxins
- Garbage ingestion vs dietary indiscretion
- Foreign body exposure
- Trauma
- Vomiting vs regurgitation
 - character of vomit - hemorrhage vs timing in relation to meals
- Health changes/ medical history and medications
- Vaccine status
- Health of other pets
- Heat cycle

Physical exam: Cardiovascular

- Mucous Membrane

- Color
- Tachyness
- Capillary refill time
 - Decreased - endotoxin/sepsis
 - Increase - hypovolemia

- Cardiac

- Murmurs
- Arrhythmia
- Pulses
 - Bounding
 - Poor



Physical exam: Neurological/ Orthopedic

- Anisocoria
- Changes to the cranial nerves
- Gait abnormalities
- Mentation
- Stiff Gait



Physical exam: Respiratory

- Harsh lung sounds
- Changes to rate and effort.



Physical exam: Other

- Sunken eyes
- Skin tent
- Trauma
- Bruising/ discoloration
- Under the tongue foreign material
- Rectal exam



Physical Exam: Abdomen

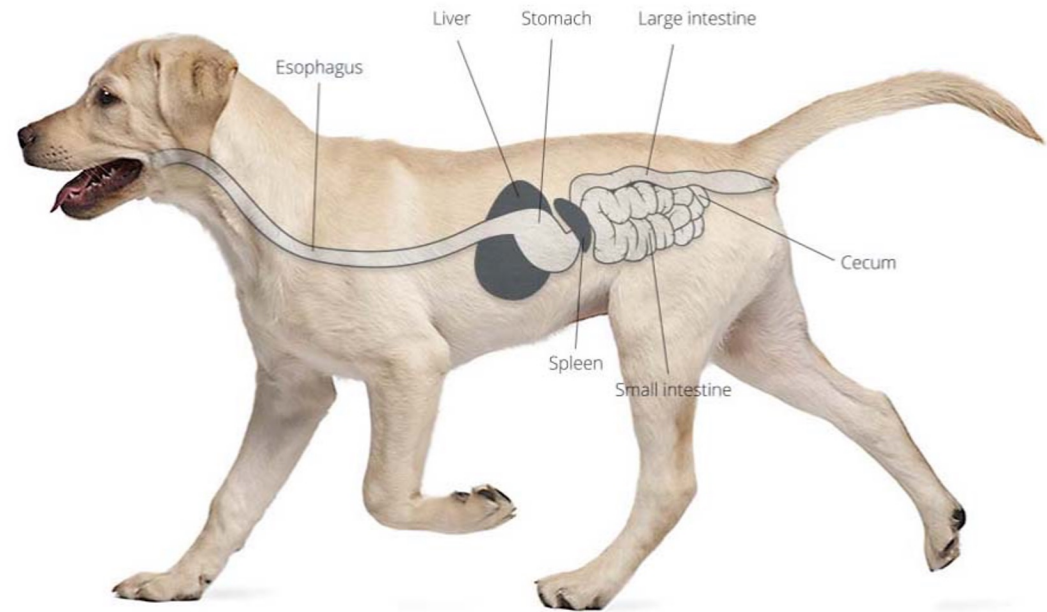
Visual inspection	<ul style="list-style-type: none">• Distention• Deformity• Bruising• Discoloration• Penetrating wounds
Auscultation	<ul style="list-style-type: none">• Borborygmi
Percussion	<ul style="list-style-type: none">• Hyperresonant vs Hyporesonant
Palpation	<ul style="list-style-type: none">• Masses• Organomegaly• Plication• Fluid• Distension

Differentials for Acute Abdomen

- Digestive
- Urinary
- Reproductive
- Peritoneal cavity
- Infectious disease
- Musculoskeletal
- Trauma
- Miscellaneous (tumor, poisoning)

Digestive

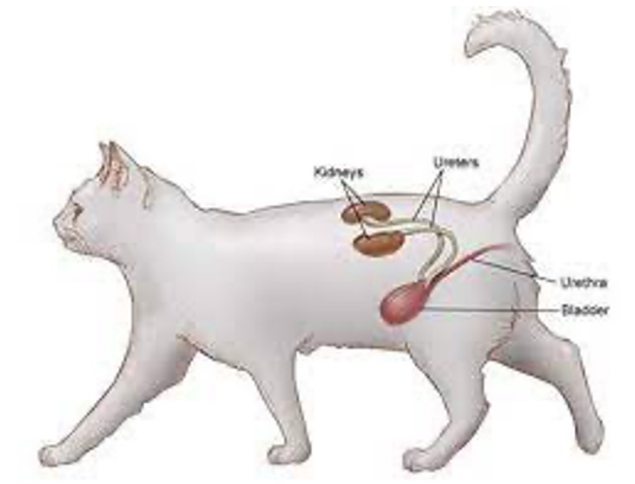
- Gastric or duodenal ulcers
- Gastritis, gastroenteritis
- Gastric dilation-volvulus
- Intestinal obstruction
- Intestinal perforation, volvulus
- Pancreatitis, pancreatic abscess
- Inflammatory Intestinal Disease
- Portal hypertension
- Ruptured bile duct, necrotic cholecystitis
- Ruptured diaphragm with gastrointestinal tract compromise



Diamond

Urinary

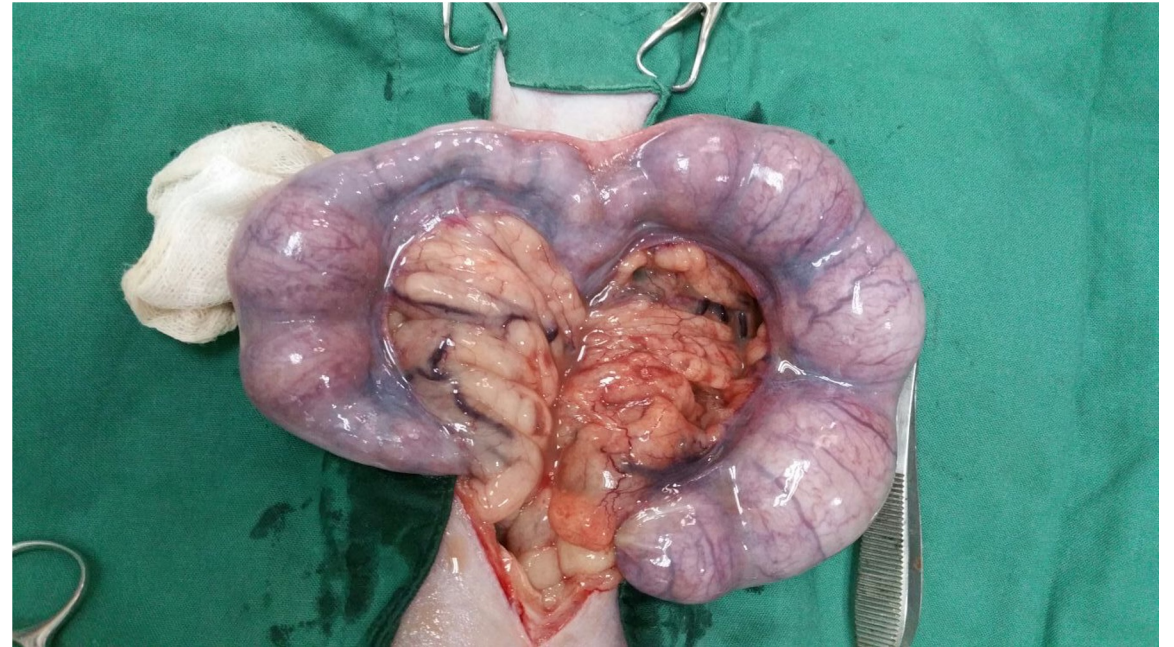
- Obstructive calculi in ureter or urethra
- Urethral obstruction with or without hydronephrosis
- Uroperitoneum (ruptured bladder, urethra, ureter)
- Acute nephritis (acute renal failure)
- Pyelonephritis
- Urethral obstruction, feline lower urinary tract disease
- Neoplasia



Cornell

Reproductive

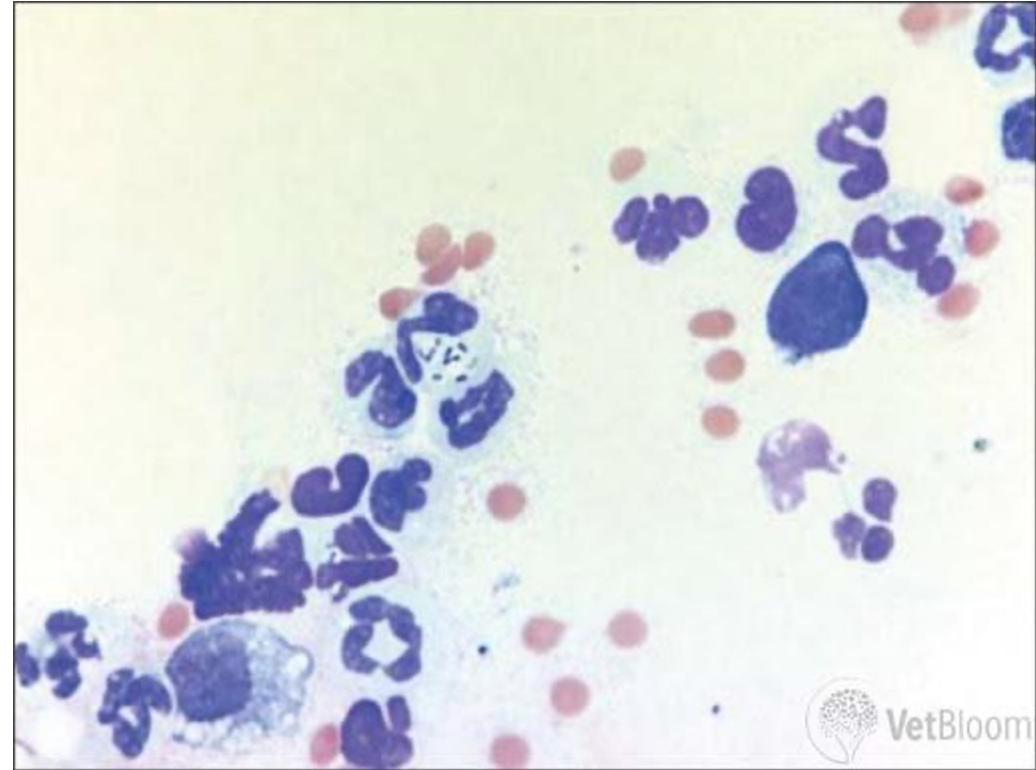
- Ruptured Pyometra
- Metritis (post partum)
- Labor/dystocia
- Uterine torsion
- Testicular torsion



United Veterinary Clinic

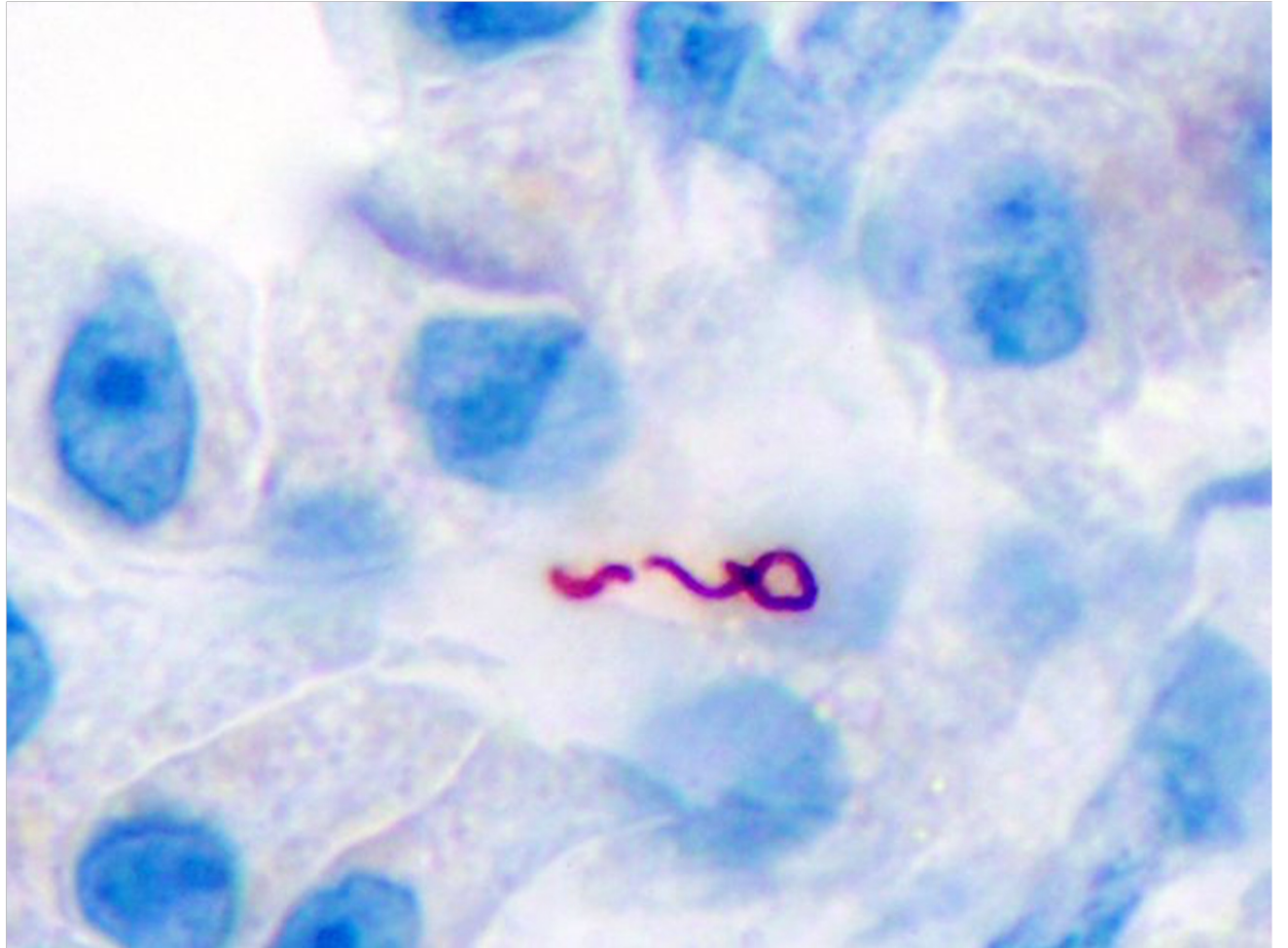
Peritoneal Cavity

- Hemoabdomen
- Septic abdomen
- Hydroabdomen
- Uroabdomen



Infectious disease

- Infectious canine hepatitis
- Leptospirosis



Michigan State University

Musculoskeletal

- Intervertebral disc disease
- Ruptured abdominal muscle



CARE Charlotte

Trauma

- Ruptured viscus
- Fractures
- Shock

Miscellaneous

- Ruptured tumor
- Poisoning – lead, thallium, arsenic

Initial Interventions

- IV fluids
 - Hypovolemia
 - Blood loss
 - Third spacing
 - GDV
 - Hyperlactemia
- Supplemental oxygen
 - patient with increased respiratory rate and effort
 - poor perfusion
- Analgesic
- +/- Antibiotics

Additional Monitoring/ Assessment

- SPO2 Evaluation
- ECG
- Blood smear



Masimo

Laboratory Analysis

- PCV/TS
- Complete blood count
- Chemistry
- Coagulation profile
- Pancreatic testing
- Urinalysis and urine sediment
- Fecal exam

Laboratory Analysis: PCV/TS

PCV:	TS:	Interpretation:
↑	Normal	Polycythaemia (rare), splenic contraction, dehydration with hypoproteinaemia, haemorrhagic gastroenteritis
↑	↑	Dehydration, fluid shift
↑	↓	Severe dehydration with loss of protein, haemorrhagic gastroenteritis, haemorrhage with splenic contraction
Normal	Normal	Normal hydration, acute haemorrhage
Normal or ↑	↓	Haemorrhage with splenic contraction, protein loss (GIT, renal) or ↓ protein production (liver)
Normal	↑	Anaemia with dehydration, normal hydration with hyperproteinaemia or hyperglobulinaemia, lipaemia
↓	Normal	Chronic RBC destruction or loss, reduced RBC production eg. anaemia of chronic disease, bone marrow disorders
↓	↓	Aggressive fluid therapy, blood dilution (>3 hours post-haemorrhage)
↓	↑	Lymphoproliferative disease, anaemia of chronic disease

Laboratory Analysis: Complete Blood Count

- Leukocytosis with left shift
- Neutrophilia vs neutropenia
- Inflammation
- Anemia

Laboratory Analysis: Chemistry with lytes

- Azotemia
 - prerenal vs renal vs post renal
- Glucose
- Electrolyte
 - hyperkalemia - renal disease
 - hyperphosphatemia - toxin vs renal disease
 - hypercalcemia - neoplasia vs renal disease
 - hyperlactatemia - perfusion
 - Hypochloremic metabolic alkalosis - upper/pyloric obstruction

Laboratory Analysis: Coagulation Profile

- Elevation $>1.3X$ PT and PTT
- Thrombocytopenia
- Liver disease vs neoplasia vs vasculitis

Laboratory Analysis: Pancreatic Testing

Test	Diagnostic Criteria	Sensitivity	Specificity
Specific cPLI (serum) for diagnosis of pancreatitis	<200 mcg/L: pancreatitis unlikely 200–400 mcg/L: gray zone >400 mcg/L: pancreatitis likely	82% with severe pancreatitis, 63.6% with less severe pancreatitis	96.8%
Specific fPLI (serum) for diagnosis of pancreatitis	<3.5 mcg/L: pancreatitis unlikely 3.5–5.3 mcg/L: gray zone >5.3 mcg/L: pancreatitis likely	67% in all cats with pancreatitis and 100% in cats with moderate to severe pancreatitis	100%
SNAP cPLI (serum) for diagnosis of pancreatitis	Spot intensity test	92%–94%	71%–78%
SNAP fPLI (serum) for diagnosis of pancreatitis	Spot intensity test	79%	80%

Laboratory Analysis: Urinalysis and Sediment

- Renal tubular casts
 - acute renal failure
- Calcium oxalate monohydrate crystals
 - ethylene glycol
- Indication of pyelonephritis or cystitis

Laboratory Analysis: Fecal Exam

- Parasites

Pro tip!

- Always try perform abdominal radiographs before performing abdominocentesis, as iatrogenic pneumoperitoneum can occur during procedure.

Imaging Analysis

- Radiograph
 - GDV
 - Pneumoperitoneum
 - Foreign material
 - Pneumocolon
 - 1-3ml/kg air
- FAST/ POCUS
- Abdominal ultrasound

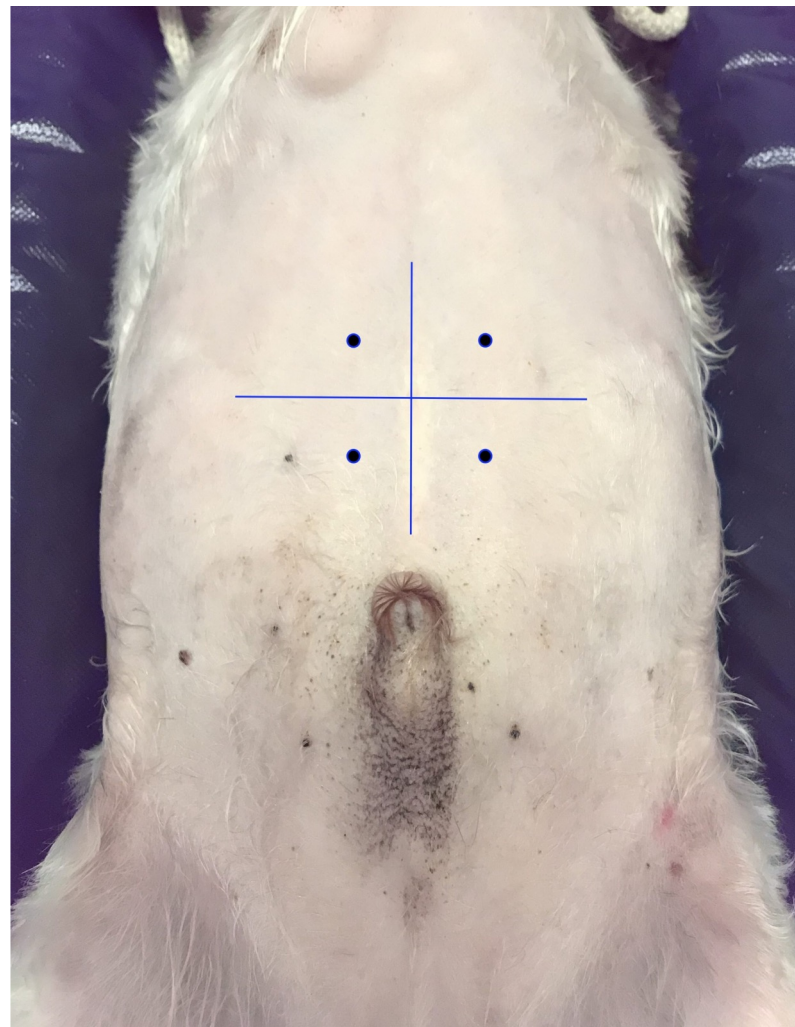


Vetflio



Abdominocentesis vs 4 Quadrant

- Four sites for needle placement are used with the umbilicus as the center point: right cranial quadrant, left cranial quadrant, right caudal quadrant, left caudal quadrant.



Fluid Analysis

Effusion Type	Appearance	Total Protein (mg/dl)	TNCC (cells/ml)	Cell Type	Specific Gravity	Possible Etiologies
Transudate	Clear, colorless	< 2.5	< 1,000	Mononuclear	< 1.018	Hypoalbuminemia Portal vein obstruction
Modified Transudate	Variable	2.5-7.5	1,000-10,000	Variable - inflammatory	Variable	Right-sided heart disease Heartworm disease Neoplasia Liver disease
Exudate	Cloudy	>3.0	> 10,000	Varies with cause, species	> 1.018	Septic v. nonseptic Neoplastic

Cytologic Analysis

- Effusion
 - ID leukocytes, bacteria, neoplasia
 - Measure
 - Sepsis
 - Lactate > 2 mmol/l difference
 - Glucose > 20 mg/dl difference
 - Uroabdomen
 - Creatinine elevation (compare to peripheral)
 - Potassium elevation (compare to peripheral)
 - Biliary tract rupture
 - Bilirubin or Biliary crystal

Test	Diagnostic Criteria	Sensitivity	Specificity
Blood glucose minus peritoneal glucose for diagnosis of septic peritonitis	>20 mg/dl	Dogs: 100% Cats: 86%	Dogs: 100% Cats: 100%
Peritoneal fluid lactate minus blood lactate for diagnosis of septic peritonitis	>2.0 mmol/L	Dogs: 100% Cats: not reported	Dogs: 100% Cats: not reported
Dogs abdominal ultrasound: small intestinal lumen dilation	Jejunal luminal diameter of >1.5 cm with normal wall layering	Not reported but should aggressively investigate for intestinal obstruction	Not reported but luminal diameter not dilated then intestinal obstruction not likely
Fluid to blood potassium ratio for diagnosis of uroabdomen	Dogs: ratio of 1.4:1 Cats: ratio 1.9:1	Dogs: 100% Cats: unknown	Not reported but considered diagnostic for uroabdomen
Fluid to blood creatinine ratio for diagnosis of uroabdomen	Dogs: ratio 2:1 Cats: ratio 2:1	Dogs: 86% Cats: unknown	Dogs: 100% Cats: unknown
Fluid to blood bilirubin ratio for diagnosis of bile peritonitis (also may see bile pigment/crystals in abdominal fluid)	>2:1	Dogs: 100% Cats: unknown	Not reported

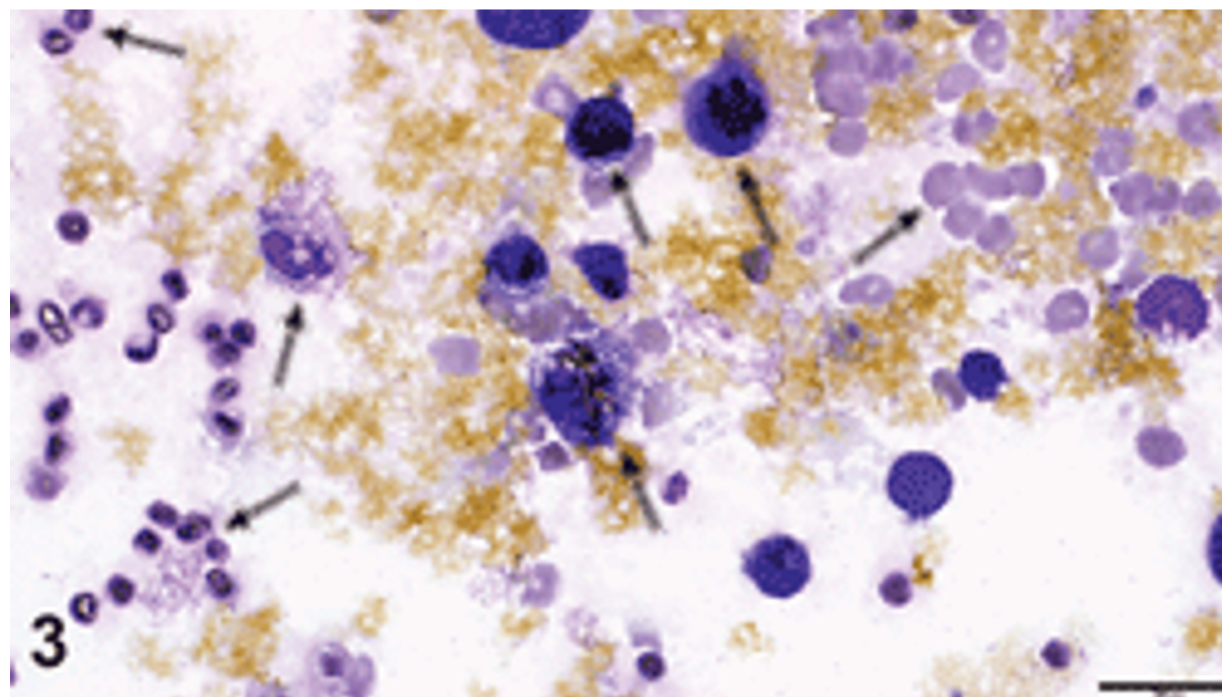
Surgical or Not

- Stability of the patient
 - Hypovolemia
 - Acid base or electrolyte abnormalities
- Underlying diagnosis



Surgical

- Intracellular bacteria
- Elevation of creatinine and potassium in the abdomen vs peripheral
- Elevation of bilirubin vs peripheral
- Free gas

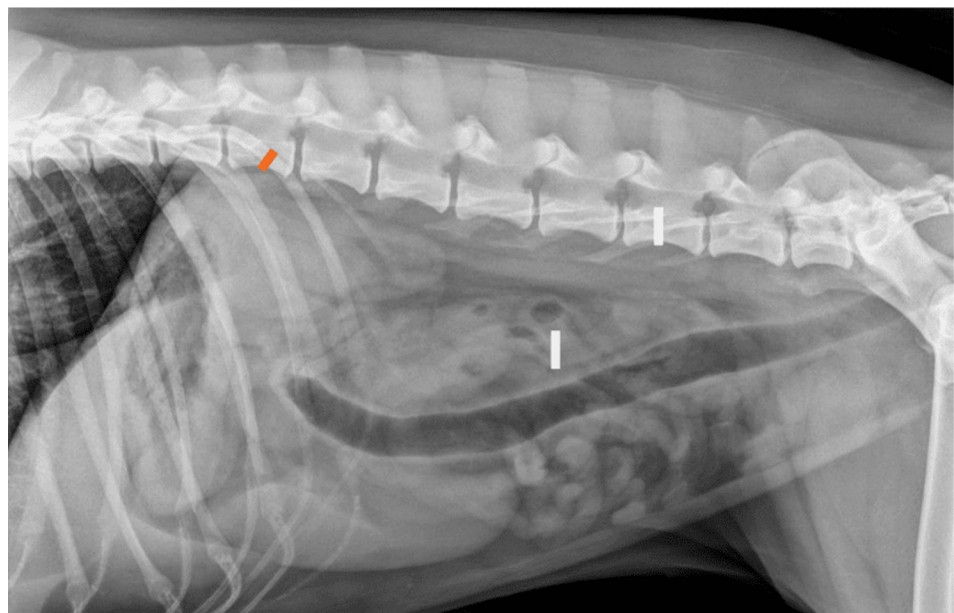


Surgical

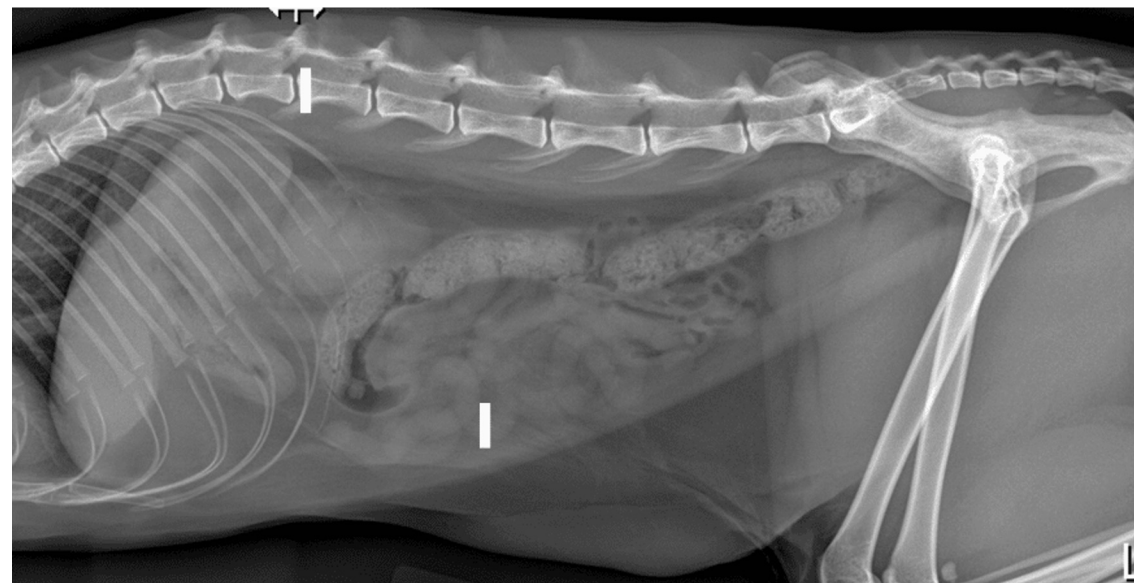
- Complete bowel obstruction
- GDV
- Inability to medically stabilize intrabdominal hemorrhage
- Mesenteric volvulus
- Penetrating abdominal injury
- Splenic torsion

Complete Bowel Obstruction

Dogs: ratio of maximal small intestinal diameter to the narrowest width of L5 on lateral radiograph	Ratio >1.6	Not reported but suggestive of small intestinal obstruction	Not reported but suggestive of small intestinal obstruction
Cats: ratio of maximal small intestinal diameter to the height of cranial endplate of L2	Ratio >2.0	Not reported but suggestive of small intestinal obstruction	Not reported but suggestive of small intestinal obstruction



Today's Veterinary Practice (Delamarter)



Today's Veterinary Practice (Delamarter)

GDV

- Green et al (JVECC 2011) found that a decrease in lactate $\geq 50\%$ within 12 hours of presentation was associated with a positive outcome.
- Santoro Beer et al (JAVMA 2013) evaluated lactate as a predictive biomarker, and found that an initial lactate cutoff of 7.4 mmol/L was 80% accurate for predicting gastric necrosis and 88% accurate for predicting outcome.



Vetgirl

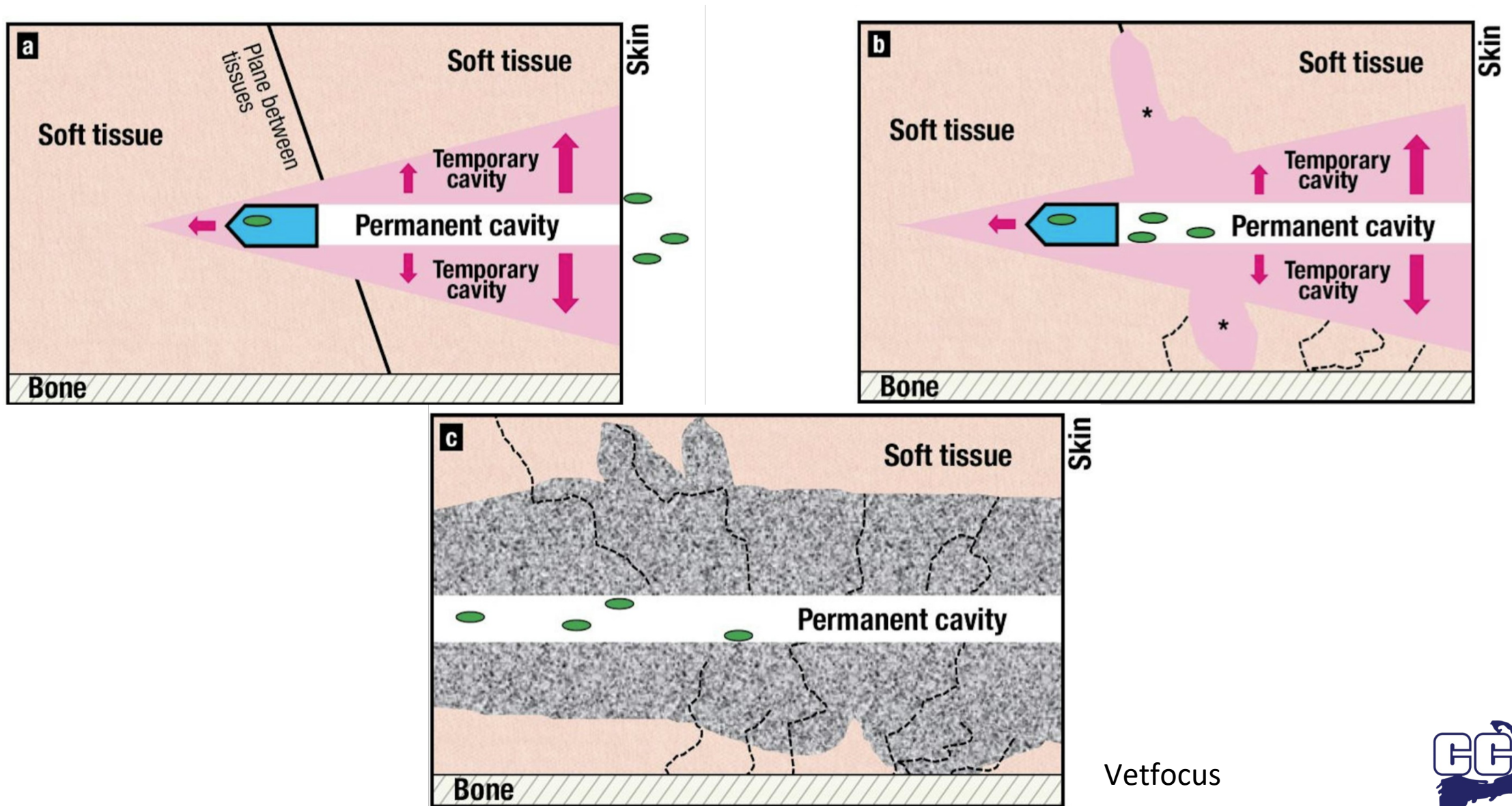
Mesenteric volvulus

- Post – op complications are common
- Surviving patient could develop short bowel syndrome after resection
 - 70% SI and if ileum is removed
- Better prognosis with large intestine vs small intestine



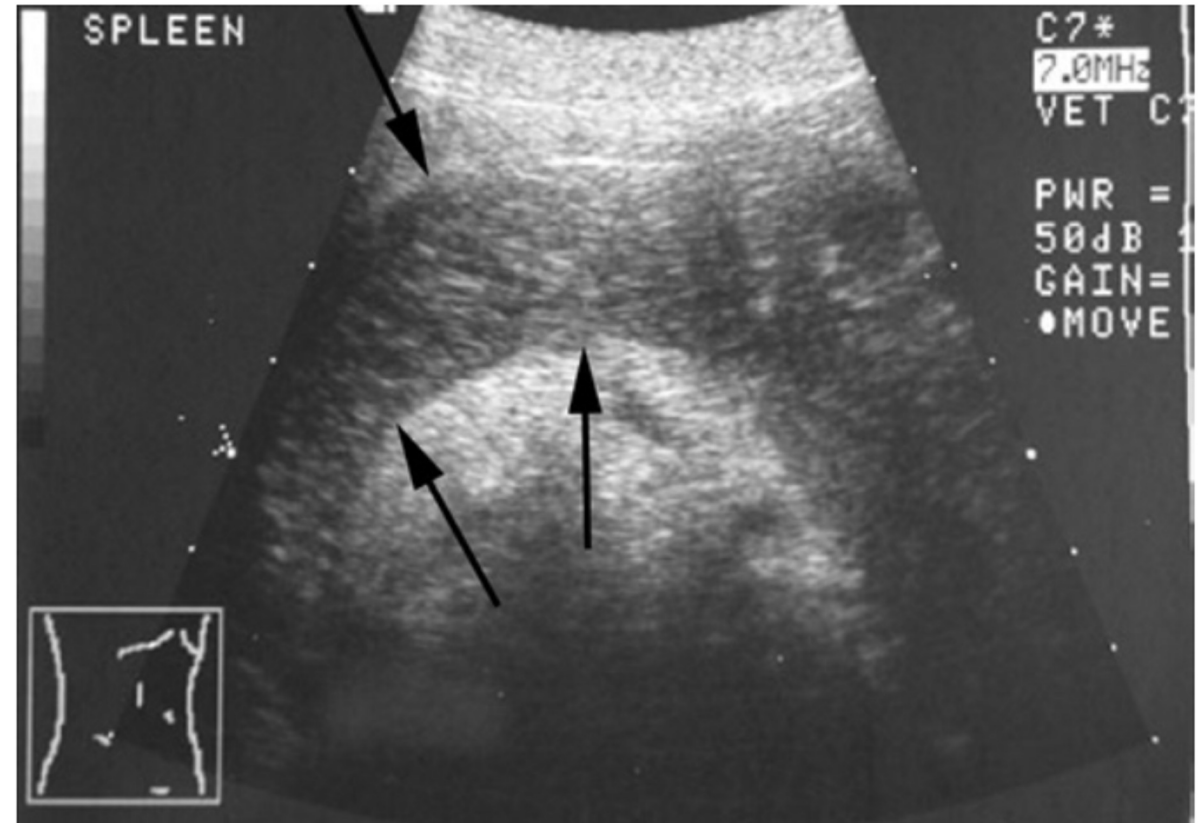
Mesenteric

Penetrating Abdominal Injury



Splenic torsion

- German Shepherd, Dane, English Bulldogs
- Clinical signs acute or chronic



Fossum

Non -Surgical

- Mild pancreatitis
- Acute Hemorrhagic gastroenteritis
- Parvoviral enteritis
- Hyperlipidemia
- Acute hepatic disease
- Acute renal disease/nephritis
- Toxin ingestion Poisoning: overview.
- Gastroduodenal ulceration
- Gastroenteritis.
- Colitis

Non –Surgical Plan

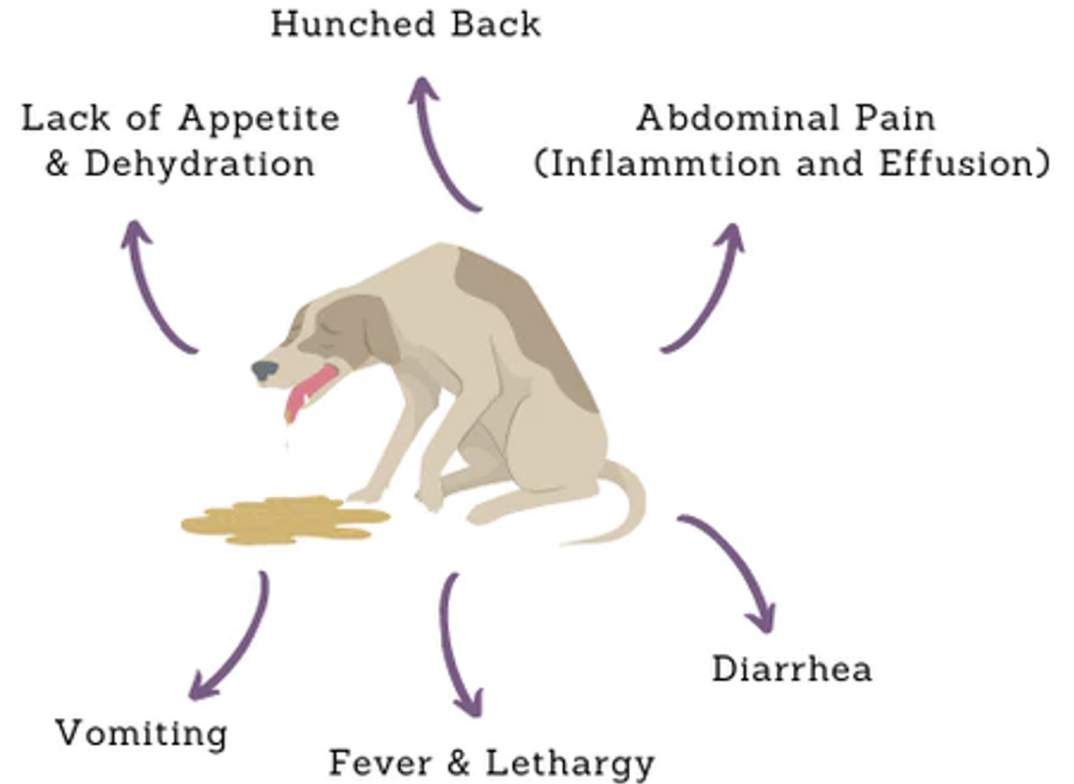
- Treatment of underlying cause
- Analgesia
 - Opioids are the mainstay of therapy
 - Multimodal approach may help minimize adverse effects including vomiting and ileus
 - Avoid NSAIDS in shock or if hepatic/renal insufficiency is present
- IV fluids with electrolyte supplementation
 - Provide patient's maintenance requirements, correct for dehydration, and ongoing losses
 - Improve patient acid-base and electrolyte status
- Nutritional support

Pancreatitis

- Pain management
- GI support
- +/- antibiotics
 - necrotizing pancreatitis
- Steroid
 - not indicated

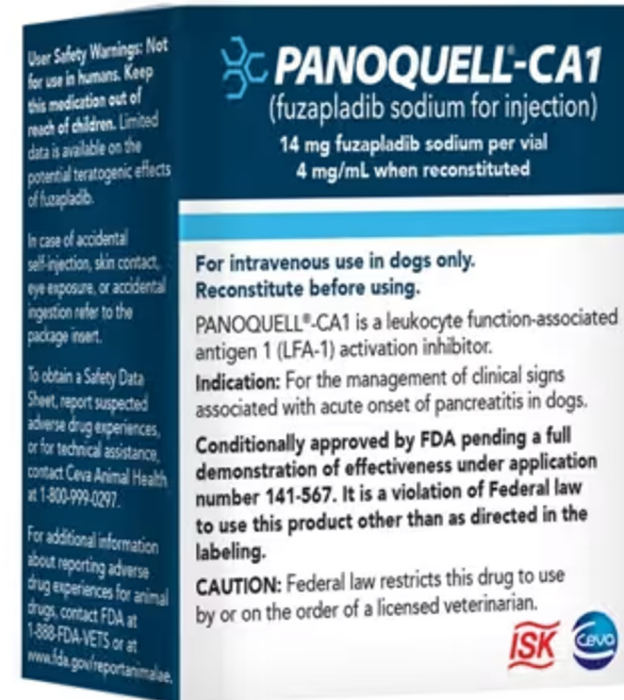
6 Signs of Pancreatitis

NutriCanine



Panoquell-CA1

- Phospholipase A2 inhibition
- To be given in the first 48 hours
- Acute pancreatitis



AHDS, Gastroenteritis, Colitis

- GI support
- Psyllium (metamucil)
 - 250-500mg every 12 hours
 - Help control diarrhea



Cases

Zoe, 9 year old FS Great Dane

- Boarding in the clinic
- Found retching, lethargic, pacing



Zoe, 9 year old FS Great Dane

- Initial PE
 - T 99.7 F, P 190 bpm, R 60/increased effort
 - Fair femoral pulses with dropped beats, injected mucous membranes, arrhythmia auscultated
 - Painful abdominal palpation
 - Distension noted
 - No crackles/wheezes/murmur



Zoe, 9 year old FS Great Dane

- Initial Plan
 - IV catheter and fluid resuscitation

Zoe, 9 year old FS Great Dane

- Tentative diagnosis
 - GDV

Zoe, 9 year old FS Great Dane

- Next steps
 - Blood work and imaging
 - Supportive therapy
 - ECG monitoring
 - Then to surgery



Murphy, 5 year old male castrated Mastiff

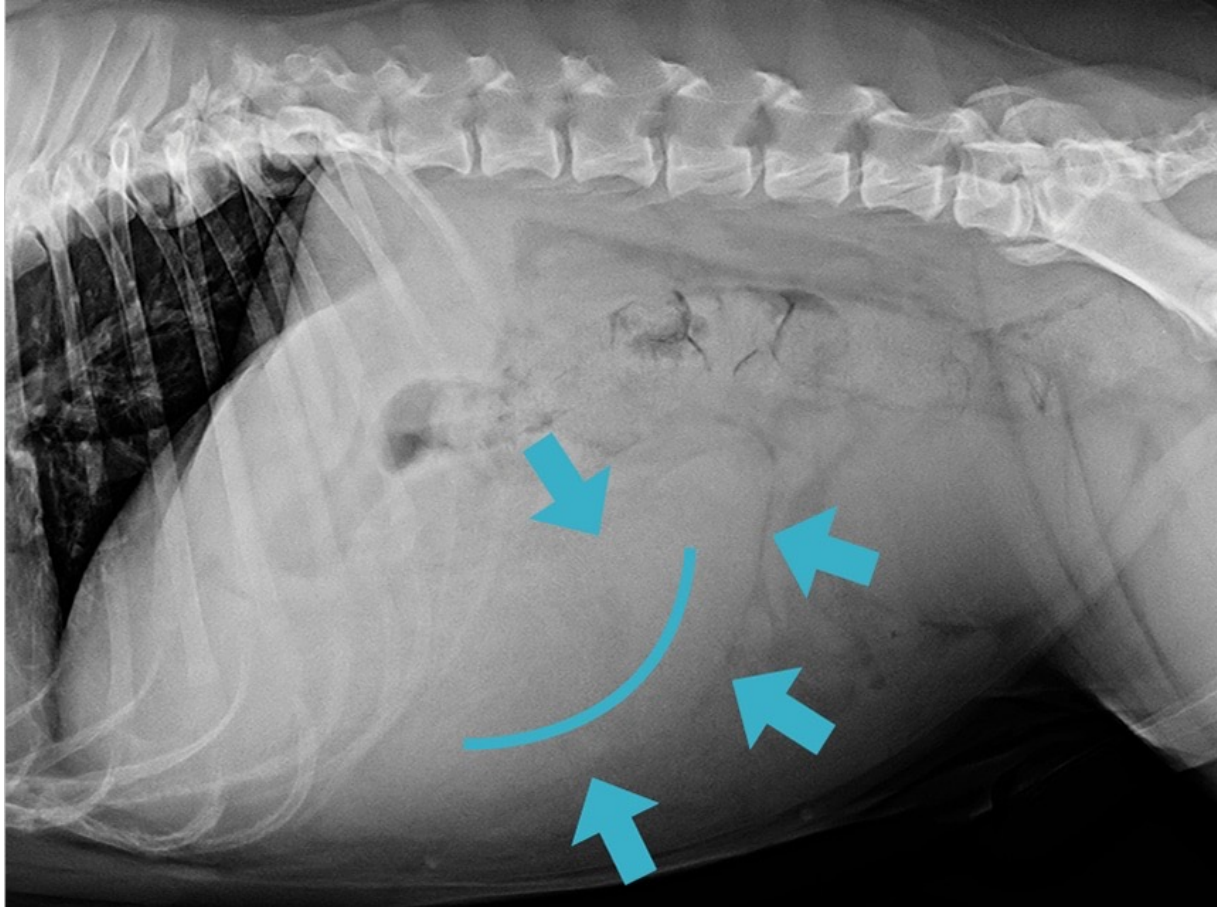
- Lethargy x 1 week



Murphy, 5 year old male castrated Mastiff

- Initial PE
 - Quiet, alert, responsive
 - T 101.7, P 170 bpm, R 40
 - Bounding femoral pulse, pale mucous membranes
 - Packed cell volume: 16%, TP 7.4 g/dL
 - Large, firm 'mass' in cranial abdomen

Murphy, 5 year old male castrated Mastiff



i:DCM / Id:ID

W:254 L:127

Murphy, 5 year old male castrated Mastiff

- Acute vs. chronic presentations
 - Acute: lethargy, collapse, shock
 - Chronic: vague, intermittent signs, weakness, pale mucous membranes, anorexia, GI signs

Murphy, 5 year old male castrated Mastiff

- Next steps
 - Blood work
 - Supportive therapy
 - Surgery
 - Splenectomy + gastropexy

Jet, 9 yr old FS Labrador

- 1 week history of vomiting, hyporexia
- Chronic Deramaxx for osteoarthritis

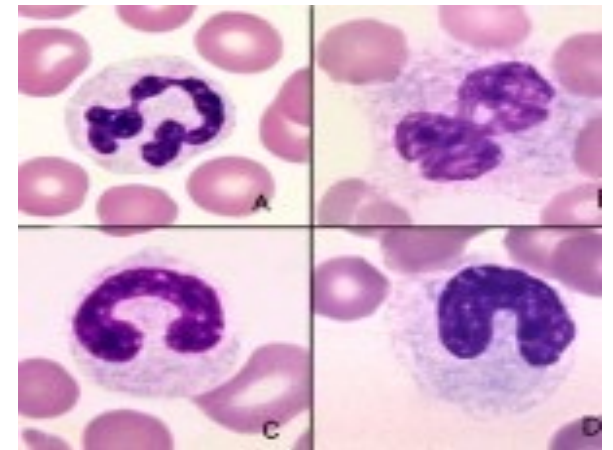


Jet, 9 yr old FS Labrador

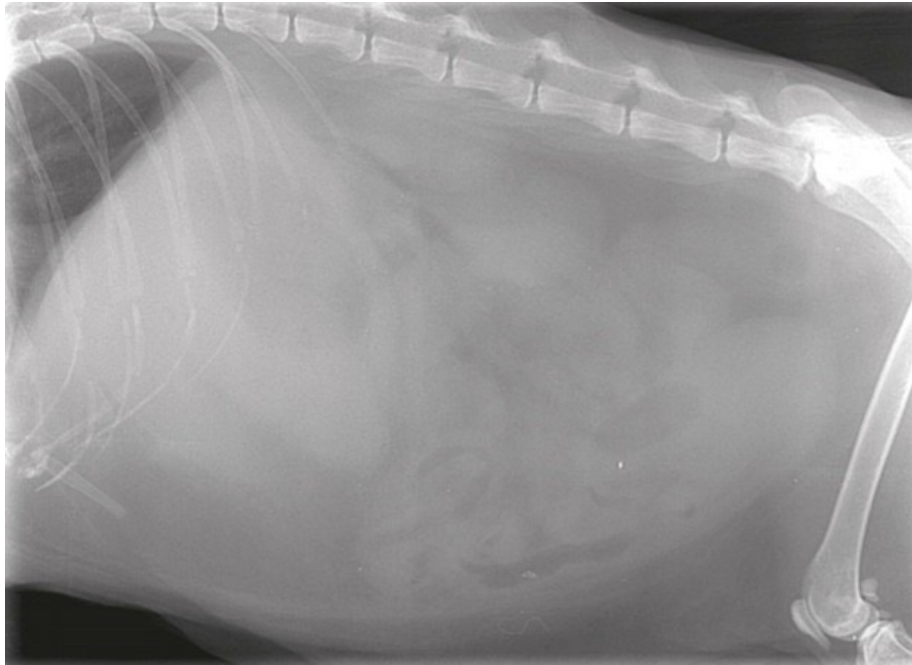
- Initial Exam
 - Bright, alert, responsive
 - T 103.1, P 150 bpm, R 24 brpm
 - Strong femoral pulses, mild discomfort on abdominal palpation

Jet, 9 yr old FS Labrador

- Minimum database
 - Complete blood count: toxic neutrophils
 - Chemistry: albumin 2.4 g/dL (rr: 2.4-3.6)
 - Urinalysis: No significant abnormalities



Jet, 9 yr old FS Labrador



KLIN, JET 12502	1081477 C8-5 Ped/ABD	15 Dec 08 10:30:00 am	TI: 01 ML: 0 Album Univer Fr #113410 1999 Jan 01 F 1081 Acc: 171 2008 Dec Img Trg: 10:30
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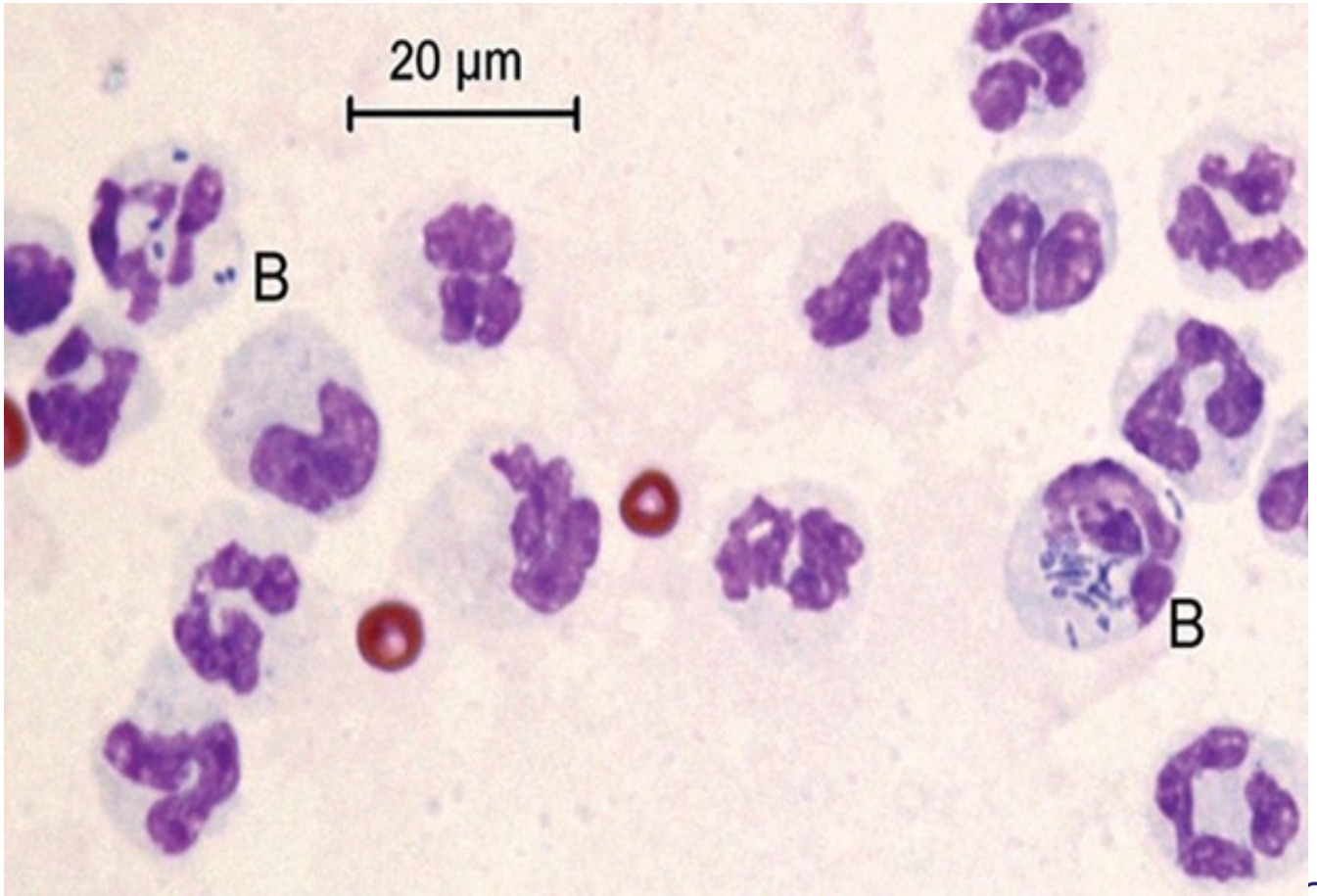
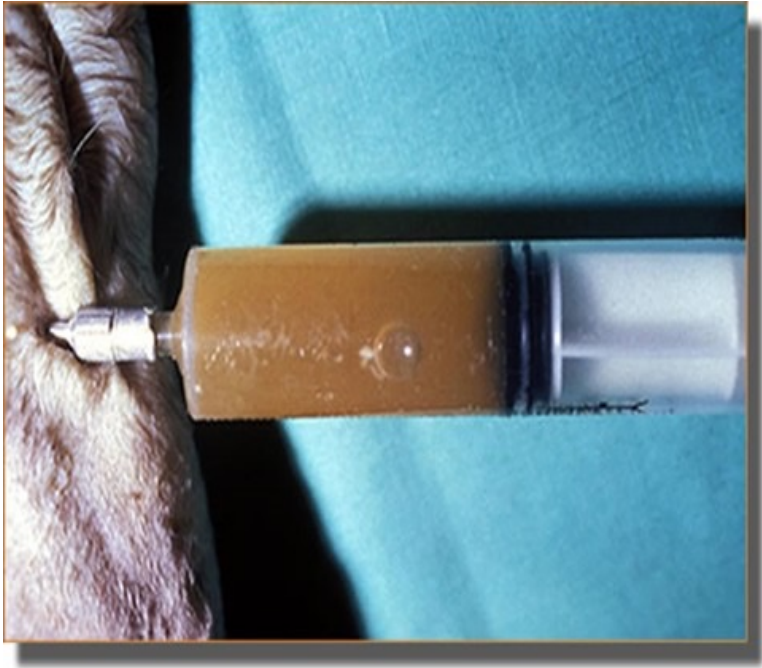
ATL

0.43cm

Id:DCM / Lin:DCM / Id:ID
W:256 L:128

The ultrasound image shows a cross-section of the thorax. A dark, anechoic area is visible, likely representing a fluid-filled space. A crosshair is placed on this area, and a measurement of 0.43cm is shown. The image is labeled 'ATL' at the top. On the right side, there are depth markers: -1, -2, -3, and -4. At the bottom left, there is a crosshair and the measurement '0.43cm'. At the bottom, there is technical information: 'Id:DCM / Lin:DCM / Id:ID' and 'W:256 L:128'.

Jet, 9 yr old FS Labrador



Jet, 9 yr old FS Labrador

- Diagnosis
 - Septic peritonitis



gettyimages
Credit: Faba-Photography

801869506

Jet, 9 yr old FS Labrador

- Next steps
 - Medical stabilization
 - Surgery



Suzie, 10 year old FS Mini Schnauzer

- 2 day history of lethargy, anorexia, vomiting



Suzie, 10 year old FS Mini Schnauzer

- Initial Exam
 - T 100.0, P 200 bpm, panting
 - Injected mucous membrane, strong femoral pulses, ~5-7% dehydrated, slightly icteric sclera
 - Painful on abdominal palpation
 - No crackles/wheezes/murmur

Suzie, 10 year old FS Mini Schnauzer

- Next steps
 - Blood work and imaging
 - Complete blood count: neutrophils 17,000 (3000- 11,500), platelets 148×10^3 (200-500)
 - Chemistry panel: ALP 610 u/L (24-150), bilirubin 2.4 mg/dL (0-0.8), albumin 2.0 g/dL (2.4-3.6)



Suzie, 10 year old FS Mini Schnauzer

- Diagnosis
 - Pancreatitis

Suzie, 10 year old FS Mini Schnauzer

- Next steps
 - Fluid therapy
 - Nutrition
 - Pain management

Reference

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- Image reference on request

Questions?



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