Gastrointestinal Tract Imaging

VMB 960
April 6, 2009

Objectives

• Stomach
• Small Intestine
• Colon
• Radiography & Ultrasound
• Contrast Examination of the Small Intestine

Reference

• Chapters 45-47
  – Pages 750-805
Stomach

• Anatomy – Ventrodorsal View

Stomach

• Anatomy – Lateral View

Right Vs. Left Lateral
Gas Rises...

<table>
<thead>
<tr>
<th>Fundus</th>
<th>Pylorus</th>
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<tbody>
<tr>
<td>R Lat</td>
<td>Gas</td>
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<tr>
<td>L Lat</td>
<td>Fluid</td>
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<tr>
<td>VD</td>
<td>Fluid</td>
</tr>
<tr>
<td>DV</td>
<td>Gas</td>
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Rugal Folds

Stomach Ultrasound

- May have limited evaluation depending on contents
Small Intestine

• Typically contains
  – Gas
  – Fluid
  – Mucus
  – Ingesta
  – Nothing
• Intestinal wall thickness CANNOT be determined on plain radiographs

Small Intestine

• Must have contrast medium filling lumen to determine wall thickness

Small Intestine Ultrasound

• Layering is important
• Note relative thickness
Ileus

- Ileus is failure of intestinal contents to pass
  - Mechanical
  - Functional
- Abnormal bowel dilation
  - Mild dilation can be difficult to differentiate from normal
    - Gas can be seen normally in the intestines
    - Peristalsis
  - Recognize colon and cecum

Bowel Dilation

- Several guidelines
  - Dog
    - > 2X width of rib
    - > 1.6X height of L5
  - Cat
    - > 12 mm (not reliable)
    - > 2X height of L2 (should be > 2.5-3X)

Mechanical Vs. Functional Ileus

- Just generalizations; there is much overlap...
- Mechanical
  - More often associated with greater dilation
  - A few loops affected (2 populations of bowel)
  - Stacked loops, hairpin turns
- Functional
  - Milder dilation, more uniform
  - Can be many loops, or just a few
Mechanical Ileus

- Physical obstruction of small intestine
- Differentials
  - Foreign body
  - Intussusception
  - Intestinal Mass
    - Tumor
    - Granuloma
  - Stricture
  - Extraintestinal
    - Mass
    - Adhesion
    - Herniation
Functional Ileus

- Lack of peristalsis due to vascular or neuromuscular abnormalities
  - Lumen remains patent
- Differentials
  - Inflammatory disease
    - Viral enteritis (Parvo)
    - Peritonitis
  - Nervous system lesions
  - Drugs
  - Pain
  - Vascular lesions (mesenteric volvulus)
  - Chronic mechanical ileus

Linear Foreign Body

- Becomes lodged – bowel peristalsis around LFB results in PLICATION
  - Tightly bunched appearance
  - Gas gets trapped in folds of intestine
    - Small irregular foci, often comma-shaped
  - May not see significant dilation
Cecum & Colon
• Remember general location
  – Can be variable in position
• Size & contents (gas, feces) also vary
• Identify to differentiate from small intestine
  – Avoid misdiagnosing ileus/foreign material

Cecum
• Typically in right cranial-mid abdomen

Constipation, Obstipation, Megacolon...

Radiographic Findings
• Colonic Impaction
  – Accumulation of feces that are more radiopaque

• Megacolon
  – Generalized enlargement of the colon
  – Normally colon should be < length of L7 vertebral body

Clinical Conditions
• Constipation & Obstipation
  – Infrequent or difficult evacuation of feces
  – Obstipation implies loss of colonic function

• Megacolon
  – Can result from mechanical or functional obstruction
  • Numerous causes
  • Ineffective motility
Upper GI Contrast Exam

• Indications
  – Luminal obstructions
  – Motility
  – Rupture
• Contraindications
  – Obstruction on radiographs
  – Perforation
  – Acute abdominal pain
  – Large volume ingesta in stomach

Upper GI

• Time consuming
  – Could take 4 hours or more
• If poor motility, could be low yield

• Generally has been replaced with ultrasound
**Barium**

- **Pros**
  - Coats well
  - Palatable
  - Not absorbed via GI tract
  - Inexpensive

- **Cons**
  - Not sterile
  - Creates granulomatous reaction in body cavities

**Iodinated Contrast Media**

- **Pros**
  - Sterile
  - Can be given IV or used in urinary studies
  - Absorbed – safe in body cavities
  - Rapid transit
  - Compatible with endoscopy

- **Cons**
  - Mucosal detail is less distinct
  - Can cause edema in lungs
  - Vomiting
  - Hypersensitivity reactions
    - Seizures, Renal Failure

**Patient Prep**

- Fast patient 12-24 hrs
- Enemas
- Withdraw medications

- No sedation
- Administer via stomach tube
Barium Dose

- 10-20 mL/kg
  - Larger dog receives lower end of dose range
  - Smaller dog or cat receives higher end
- Must be delivered as bolus
- Adequate volume and bolus are important to stimulate gastric emptying
- Emptying will begin immediately

Radiographic Views

- Surveys
  - R Lat, VD
  - Check for contraindications and adequate prep
- Post-contrast
  - R Lat, L Lat, VD, DV
    - Immediately
  - R Lat, VD
    - 15, 30, 45, 60 minutes
    - Hourly until barium reaches colon

Normal Transit Times (Approximate)

- 15 min  Barium in duodenum
- 30 min  Jejunum well-filled
- 1-2 hours  Stomach empty
- 2-4 hours  Enters colon
- 6 hours  Jejunum empty
Normal variants

- Canine pseudoulcers
  - Peyer’s Patches
  - GALT – lymphoid tissue in the duodenum
- Feline “string of pearls”
  - Peristalsis of duodenum

Feline

Canine
Pseudoulcers (Peyer’s Patches)

- Focal craters in the mucosal margin
- Multiple

Pseudoulcers (Peyer’s Patches)

- Ultrasound
  - Focal depressions/thinning of mucosal layer

Small Intestine

- Evaluate the small intestine
  - Margination & wall thickness
  - Fimbriation (wispiness)
- Flocculation
Linear foreign body

“Thumbprinting”
- Regularly spaced divots
  - Ribbon-like appearance
- Due to intestinal spasm
- Differentials
  - Inflammation/infiltration
  - Lymphocytic-plasmocytic enteritis
  - Parvovirus
  - Lymphoma
  - Eosinophilic infiltration

Thumbprinting
Intraluminal Obstruction

- With contrast medium – filling defect
  - Even if radio-opaque on survey

Complications

- Barium in lung
  - Only problem with large volume
- Ending study too soon
  - Radiograph next morning
- Insufficient volume of barium
- Decreases absorption of medications

Barium In Lungs

- Careful gastric tube placement
  - Measure tube
  - Palpate neck
  - Listen
  - Inject small amount of water
  - Make radiograph
Delayed Emptying/Transit

- 4 hours
- Treated with anti-diarrhea drugs
- Inadequate dose
- Food in stomach
- High sympathetic tone
  - Anxiety
  - Pain