Diagnostic Imaging Features of Canine Gastrointestinal Pythiosis

Introduction

- Pythiosis is a chronic pyogranulomatous infection caused by oomycete or pseudo-fungus *Pythium insidiosum* (water mold)\(^1\)
  - **Global disease**
    - subtropical regions of Australia, New Zealand, Southeast Asia, Korea, Japan, South America, and the Caribbean\(^2,3\)
    - United States, primarily the Gulf Coast, but has been reported as far north as New Jersey, Virginia, Kentucky, southern Illinois, and southern Indiana, and as far west as Arizona, Oklahoma, Missouri, Kansas, and California.\(^1\)
  - **Gastrointestinal form** and cutaneous form
    - Likely causes infection by encysting in damaged skin or GI mucosa\(^1\)
      - speculation that animal with parasite-induced injury to GI mucosa are more likely to become infected
    - **Gastrointestinal form** is characterized by severe pyogranulomatous inflammation of the stomach, small intestine, and colon
      - Pharyngeal region and esophagus (rare)
    - Frequently the GI lesions are extensive by the time of clinical presentation and diagnosis
    - Most patients die within three months of diagnosis\(^4\)
  - **Risk factors include but aren’t limited to:**
    - young large breed dogs which had recurrent exposure to standing freshwater habitats during warm months\(^1,5,6\)
    - Outdoor working dogs such as Labrador retrievers are overrepresented\(^1\)
  - Also reported in:
    - Smaller breeds with no known exposure to standing freshwater areas\(^1\)
    - cats\(^7\)
    - Horses and cattle
    - cetaceans (dolphins, porpoises)

Clinical signs/presentation of GI pythiosis

- Chronic weight loss, vomiting, diarrhea, and/or hematochezia; if present long enough, extreme emaciation is present
- Regional lymphadenomegaly
- Large, palpable abdominal mass (adhesions of bowel to other organs)
- Acute onset may be seen due to vascular invasion of the root of the mesentery resulting in infarction of the gastrointestinal tract\(^8\)
- Advanced stages may present as GI perforation or hemoabdomen
Lethargy and depression are generally NOT present unless secondary intestinal obstruction, infarction, or perforation is present.

Radiographic appearance

- Highly variable
  - Normal abdomen
  - +/- dilated or stacked bowel segments = ileus
  - +/- Mass lesions
  - Recently diagnosed patient had grossly dilated stomach secondary to lesions in the duodenum and pylorus causing outflow obstruction

- GI contrast series (barium, iodine)
  - Signs of outflow obstruction

Ultrasound appearance

- Normal canine stomach and small intestine
  - Five definable wall layers
  - Normal stomach wall measures up to 5 mm in thickness (>\(\geq\) 7 mm is considered pathologic)
  - Normal small intestine are: measures 3 mm in thickness (>\(\geq\) 5 mm is considered pathologic)

- Hallmark is thickening of the wall of the gastrointestinal tract ranging from 5-20 millimeters in thickness
  - Loss of wall layer visibility
  - Thickened wall characterized by homogeneously echoic tissue

- Lesions are most commonly focal, although the length of affected intestine cannot always be estimated accurately.

- +/- Enlarged regional lymph nodes (moderate to severe)
  - Hypoechogenic to mixed echoic appearance of the nodes
  - The appearance of the lymph nodes is more consistent with neoplasia

- +/- Hyperechoic peripancreatic fat

- +/- distended gallbladder and common bile duct (extrahepatic biliary obstruction)

- Differential diagnosis:
  - Gastrointestinal neoplasia
  - Uremic gastropathy
  - Benign gastric ulcers
  - Plasmacytic-lymphocytic enteritis (thickening only, no loss of wall layer visualization)
  - Lymphangiectasia (thickening only, no loss of wall layer visualization)
  - Pancreatitis (thickening only, no loss of wall layer visualization)

Diagnosis

- Abdominal US to localize the thickened GI tissue (stomach, duodenum, remaining SI, and colon) prior to surgery
- ELISA serology - 100% specificity and 100% sensitivity
Dr. Joe Newton, Auburn University

- Frozen serum or iced serum – not whole blood
  $15 (as of July 2006)
- Dr. Amy Grooters, LSU
- Dr. Leo Mendoza, Michigan State University

PCR
- Dr. Amy Grooters, LSU
- Three-view thoracic radiographs to rule in/out pulmonary metastasis
- Endoscopy may show an inflammatory-type appearance – generally not very helpful, and endoscopic biopsies may yield false-negative results because they fail to sample deeper tissues

**Treatment options**
- Aggressive surgical resection is the treatment of choice
  - Frequently the GI lesions are extensive by the time of clinical presentation and diagnosis at AUCVM, precluding surgical intervention
  - Lymphatic and vascular invasion is common making successful surgical resection rare
  - Expect decrease in ELISA values post-surgery if no reoccurrence
  - Medical therapy is generally unrewarding; combination protocols superior to single antifungals

**Prevention**
- Vaccines – work in progress - efficacy poor at this time
- Mendoza at Michigan State uses immunotherapy in horses with success
  - Does not work well in dogs

**Comments**
- The **importance of early diagnosis** by primary veterinarians cannot be overstated
- GI pythiosis should be on the differential list for any vomiting dog that
  - does not respond to empiric treatment
  - radiographs display signs of mass lesion or partial obstruction
  - should be considered in any patient that endoscopic biopsies reveal eosinophilic or pyogranulomatous inflammation without identification of an etiologic agent

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References


