Pathology of the Alimentary System

Lecture 6
Diseases of intestine

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VII. Small & Large Intestines

Structure & Function

- Long coiled tube, large surface area
  - Folded mucosa
  - Villi (7-14 fold increase)
  - Microvilli (15-40 fold increase)

- Digestion, absorption, excretion
- Fermentation vat (cecum)
- Good defense mechanisms

Schematic illustration of the epithelial cell types of the small intestine

Pathologic Basis of Veterinary Disease, 5th ed., Mosby-Elsevier
Schematic diagram of the anatomic and histologic organization of the digestive tube.
VII. Diseases of Small & Large Intestines

- Congenital anomalies
- Obstruction & functional disorders
- Inflammation
- Specific enteric diseases (mostly infectious)
- Neoplastic diseases
1. Congenital anomalies

1.1 Segmental defects

- Stenosis (partial occlusion)
- Atresia (complete occlusion)
  - Atresia ani, atresia coli, atresia ilei


Abdominal distension, atresia coli. Results from obstruction of distal part of gut

Pathologic Basis of Veterinary Disease, 5th ed., Mosby-Elsevier

Blind end atresia (atresia coli), calf. There is a blind-ended atretic segment of the colon. The smaller segment at the left of the photograph is distal, the terminal part of the colon.
1. Congenital anomalies

1.2 Persistent Meckel’s diverticulum*
- Derived from omphalomesenteric duct (stalk of the yolk sac)

*Diverticulum= Blind outpouching of the intestine that communicates with the lumen and include all the layers of the bowel wall.

1.3 Megacolon
- Reduction/absence of ganglion cells of myenteric plexus (aganglionosis)
- 2ary to atresia ani
- Damage to the colonic innervation

Meckel diverticulum, equine. The blind pouch (M) is located on the antimesenteric side of the small bowel.

Megacolon, cat. Fecal-filled, enlarged colon
2. Obstruction & functional disorders

- Obturation (intraluminal)
- Compression (external)
- Stenosis (strictures or narrowing)
- Intestinal displacement
- Functional (absence of peristalsis)

Enterolith, horse

Foreign body (sock), accordion-folded intestine, dog

Intestinal stricture, horse. Healing by fibrosis due to penetrating wounds or vascular injury may lead to narrowing of the lumen and partial or complete obstruction.

Noah’s arkive
Consequences of obstruction

- **Death from**
  - Toxemia (bacterial overgrowth)
  - Shock (dehydration, etc)
  - Starvation

- **Gross lesions**
  - Distended abdomen
  - Dilated bowel proximal to obstruction
  - Collapsed and empty distal part
  - **Congested/infarcted area of obstruction**
  - Perforation
2.1 Intussusception

- Telescoping
- Intussusceptum (entrapped segment)
- Intussusciptiens (enveloping segment)
- Irritability/hypermotility
- Vascular strangulation → congestion/edema → ischemia → infarction → gangrene

2.2 Paralytic (adynamic) ileus

- Absence of normal tone & peristalsis → pseudoobstruction
- Intestine is dilated and wall is flaccid
- Extensive bowel manipulation

Possible causes
- Peritonitis/enteritis
- Shock
- Toxemia/sepsis
- Herniation
- Hypokalemia
- Uremia
- Tetanus
- Heavy-metal poisoning
- Grass sickness (Equine dysautonomia)

Microscopic changes in equine dysautonomia. Autonomic ganglion cells with vacuolar degeneration (arrows) and central chromatolysis (c, inset).

Adynamic ileus, reptile. Marked intestinal dilation.
2.3 Herniation

Displacement through a foramen

2.3.1 Internal
- Foramen of Winsloe (epiploic or omental)
- Omental or mesenteric tears
- Renosplenic ligament

2.3.2 External (have an hernial sac)
- Diaphragmatic
- Ventral
- Umbilical
- Scrotal or femoral

2.3.3 Sequelae:
- Incarceration (fixation)
  - Strangulation (interference with blood flow)
- Perforation
- Adynamic ileus

Herniation through the diaphragm, dog
2.4 Volvulus

- Twisting on mesenteric axis (volvulus)
- Left colon in horses
- Luminal & vascular compromise = obstruction & infarction

Volvulus of small intestine (dog, left) and spiral colon (pig, right) resulting in marked dilation and venous infarction.
2.5, 2.6 Torsion & pedunculated lipomas

- **Torsion** = Rotation along long axis
  - Cecum

- Luminal & vascular compromise = obstruction & infarction

- **Mesenteric lipomas** wrap around the mesentery or the bowel → strangulation

*Torsion, large colon, horse.* Note the sharp line of demarcation between viable colon (to the right) and nonviable colon (to the left) caused by obstruction of venous blood flow.

*Pedunculated lipoma,* horse (L). The tumor wrapped around the mesentery and strangled the bowel.
3. Inflammation of intestines

- **Diarrhea**
  - An increase in stool mass, stool frequency, and/or stool fluidity

- **Dysentery**
  - Painful, bloody diarrhea

Winter dysentery, bovine. Note the hemorrhagic content in colon, bovine. *Noah’s arkive*
Consequences of diarrhea

- Dehydration
- Acidosis
- Hypoproteinemia & ascites
- Electrolyte imbalance
- Death

Ascites and emaciation, resulted from hypoproteinemia. Protein-loosing enteropathy in a Doberman pinscher.
Pathophysiology of diarrhea

- **Malabsorption** - Defective digestion/absorption → stools with increased osmolarity

- **Osmotic diarrhea** - Exerted by luminal solutes

- **Hypersecretion** - Excessive intestinal fluid secretion induced by enterotoxins

- **Exudation** - Increased capillary or epithelial permeability

- **Deranged motility**
  - Intestinal **hypermotility** → decreased intestinal transit time
  → Malabsorption

  - **Decreased motility** → increased intestinal transit time → Bacterial overgrowth → Malabsorption
Gross types of enteritis

- Catarrhal
- Hemorrhagic
- Fibrinous/fibrinonecrotic
- Ulcerative
- Proliferative/hyperplastic
- Granulomatous

- Microscopic features in enteritis (will be reviewed in some diseases)
Causes of enteritis

- Viruses
- Bacteria
- Parasites
- Dietary factors
- Ingested intoxicants
- Allergies
- Idiopathic

Noah's arkive

Necrohemorrhagic enteritis, small intestine, horse. Necrosis and sloughing of the mucosa caused by the ingestion of cantharidin, a toxin in ingested blister beetles (*Epicauta* spp).

Ulcerative colitis, right dorsal colon, horse. Etiology: NSAIDs