Diseases of Stomach & Abomasum

- Physical influences
- Gastric Ulcers
- Gastritis
- Parasitic Diseases
- Neoplasia
Physical Influences

- Acute gastric dilation & volvulus (GDV)
- Displaced abomasum
- Chronic gastric dilation
- Abomasal dilation & emptying defect
GDV - Pathogenesis

- Failure of normal eructation & pyloric outflow
- Mostly large dog breeds, rarely horses & pigs
- Follows large meal (dry or highly fermentable)
- Xs gas production → functional obstruction of cardia & pylorus → dilation → torsion → volvulus
- Compression of lung & posterior vena cava
- Circulatory collapse (shock)
- Death from respiratory & circulatory failure
GDV - Gross lesions

- Severe abdominal distension
- Clock-wise rotation of stomach
- Hemorrhagic infarction
- Rupture of stomach (equine)
- V-shaped bending of enlarged spleen
- Congestion of intestines
Schematic and actual illustration of **Gastric dilation and volvulus**, dog. The stomach is filled with fluid and gas and the serosa is congested. The spleen is engorged, displaced to the right, and V-shaped. Death is usually from hypovolemic shock following compression of lungs and posterior vena cava.
GDV, V-shaped bending of enlarged spleen

GDV, Clock-wise rotation of stomach

GDV, compression of the caudal vena cava
Abomasal Displacement

- LDA mostly in dairy cows
  - Common GI disorder requiring surgery
  - Associated with parturient stress
  - Affects mostly high producers
  - Feeding high grain diet
  - Rarely fatal

- RDA mostly in calves - fatal
Abomasal volvulus and dilation, calf. The abomasum is normally on the ventral side but here, it has been displaced to the right and dorsally.
Stomach/Abomasum (contd)

- **Gastric Dilation**
  - Acute dilation & rupture
    - Horses ingesting fermentable feed
    - Could be secondary to intestinal obstruction
    - Distinguish from post mortem rupture
  - Chronic
    - Secondary to other conditions
    - Abomasal Dilation and Emptying Defect
Stomach rupture, horse. Stomach rupture occurs following ingestion of highly fermentable feed.

Omasal impaction, cow.

Abomasal impaction, cow.
Gastric Ulcers

- Important but less so than in humans
- Imbalance of aggressive & protective factors in mucosa
- Epithelial necrosis $\rightarrow$ erosion $\rightarrow$ ulceration $\rightarrow$ perforation $\rightarrow$ peritonitis

Main signs:
- Hematemesis
- Melena
- Anemia
- Abdominal pain
Schematic illustration of gastric ulcer formation in humans (Kumar, Abbas & Fausto, 2005)
Gastric Ulcers - Etiologic Factors

- Local mucosal injury
- Normal or high gastric acidity
  - Mastocytoma - via xs histamine
  - Zollinger-Ellison syndrome - via xs gastrin
- Local ischemia (stress-induced)
- Steroids & NSAIDs (aspirin)
  - Interference with PG synthesis
  - Direct epithelial necrosis
- Others
  - Diet, foreign bodies, infections, uremia
  - Role of Helicobacter spp undetermined in animals, unlike in humans.
Gastric Ulcers - Gross lesions

- Cattle
  - Punched out areas in pylorus, may perforate
- Pigs
  - Round/oval/stellate craters in pars esophagea
  - Craters covered with fibrin & blood clots
  - Most are incidental but may cause melena
  - Few lead to acute fatal hemorrhage into GIT
- Horses: often subclinical
- Dogs: body, pylorus & duodenum
Gastric ulcers in animals. In calves, gastric ulcers may perforate (top left) and cause fatal peritonitis. In pigs, they occur as a oval or rectangular crater (top right), often as incidental finding, but could be fatal. In dogs, they often involve the pylorus (bottom left) and the dog could bleed to death.

Bleeding peptic ulcer, duodenum, dog
Gastritis

- Dogs & cats
  - Cause often undetermined
  - Uremia $\rightarrow$ gastric vasculopathy
  - *Helicobacter* spp??

- Cattle, sheep & goats
  - Braxy (bradshot) due to *Cl. septicum*
  - Mycotic infections
Acute hemorrhagic gastritis involving glandular stomach, pig with acute septicemia.

Multifocal hemorrhagic infarcts in mycotic gastritis (abomasitis), calf

Braxy, lambs (bottom). Acute, hemorrhagic and emphysematous abomasitis due to exotoxin of *Clostridium septicum*
Parasitic diseases

- **Ruminants**
  - Haemonchosis
  - Ostertagiosis (types I & II)
  - Trichostrongylosis

- **Equine**
  - Gastric bots
  - Draschia megastoma
  - Trichostrongylosis

- **Swine**
  - Hyostrongylosis
Abomasal parasitism & hemorrhage, sheep with hemonchosis. Blood within the gut of the parasite gives it the characteristic barber’s pole appearance (below).


Draschia megastoma, horse
Neoplasia

Primary gastric tumors are uncommon in animals

- Lymphoma (cats, cattle etc)
- Squamous cell carcinoma (equine)
- Adenocarcinoma (dogs)
  - Thick, ulcerated plaque
  - Marked scirrhous reaction (desmoplasia)
  - Metastases common
- Polyps
Gastric lymphoma, cat stomach (left) and bovine abomasum (right). Expansile, lobulated & ulcerated masses.

Gastric squamous cell carcinoma, equine. Proliferative & ulcerated mass.

Gastric adenocarcinoma, ulcerated (left), and "leather bottle appearance in linitis plastica right).
Small & Large Intestines: Structure & Function

- Long coiled tube with large surface area for digestion & absorption
  - Folded mucosa
  - Villi (7-14 fold increase)
  - Microvilli (15-40 fold increase)
  - Cecum

- Good defense mechanism
Structure & function of intestines. Digestive and absorptive surface area is markedly increased by mucosal folds (left), villi in small intestine (middle) and microvilli on enterocytes (right).
Diseases of Small & Large Intestines

- Congenital anomalies
- Obstruction & Functional disorders
- Inflammation
- Specific enteric diseases (mostly infectious)
- Neoplastic diseases
Congenital anomalies

- **Segmental defects**
  - Stenosis
  - Atresia

- **Persistent Meckel’s diverticulum**
  - Derived from omphalomesenteric duct

- **Megacolon**

**Blind end atresia**

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

**Types of stenosis & atresia**
Meckel diverticulum. The blind pouch is located on the antimesenteric side of the small bowel.

Atresia ilei in a lamb. Marked distension and hyperemia of the blind end is due to stasis, of ingesta, bacterial overgrowth and gas produccion.

Megacolon, cat. Fecal-filled, enlarged colon could be congenital (congenital lack of intestinal innervation), or acquired (following nerve injury).
Obstruction & functional disorders

- Obturation (from within or intraluminal)
- Compression (external)
- Stenosis (strictures or narrowing)

- Enterolith, horse
- Foreign body (sock), intestine, dog
- Ascarid impaction, jejunum, horse
Consequences of obstruction

Vary with type and location of obstruction

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

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

Stricture, intestine horse. Healing by fibrosis → narrowing of the lumen → partial or complete obstruction → dilation (D) of proximal intestine. Initial injury could be penetrating or nonpenetrating wounds, or vascular injury.
Visceral displacements & functional disorders that lead to intestinal obstruction

- **Intussusception**
  - Telescoping (intussusceptum/intussusci piens)
- **Paralytic (adynamic) ileus**
  - Absence of normal tone & peristalsis
- **Herniation**
  - Displacement through a foramen
- **Volvulus and torsion**
  - Twisting on mesenteric axis
  - Rotation along long axis

Major causes of intestinal obstruction (Kumar, Abbas & Fausto, 2005)
**Intussusception**, intestine pig (above), dog (below). Affected segments are folded like accordion as a result of telescoping of one segment into another. Congestion is due to impaired venous return → strangulation and infarction. The portion of the intestine distal to the intussusception is small, relative to the proximal portion (below).
Herniation

- Displacement through foramen
- Internal
- External
- May cause
  - incarceration,
  - infarction,
  - ileus or
  - perforation

Herniation through the epiploic foramen (horse, above) and through the diaphragm (cat, below)

Umbilical hernia
**Volvulus** of small intestine (horse, above and bottom left) and of spiral colon (pig, above right) results in vascular compromise and infarction.

**Pedunculated lipomas** in horses (arrows) can also cause strangulation and death.
Thank you!
Have a good weekend

Ateloprosopia: Incomplete development of the face