VPM 221

Pathology of the alimentary system and peritoneum

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• Textbooks
  – Pathologic Basis of Veterinary Medicine, McGavin & Zachary, 4th ed. 2006
  – Veterinary Pathology, Jones, Hunt & King, 6th ed. 1997
  – Tumors in Domestic Animals, Meuten, 4th ed. 2002
Introduction

- Mouth
- Esophagus
- Stomach
- Intestines
- Peritoneum
- Liver & Pancreas (dealt with separately)
Pathology of Alimentary System and Peritoneum: The Big Picture

- Stomatitides
- Oral tumors
- Ruminal tympany
- GDV
- Grain overload
- Gastric ulcers
- Intestinal obstructions
- Enteritis & diarrhea
- Neonatal diarrhea
- Diarrhea in adults
- Peritonitis and abdominal fat necrosis
Alimentary system

- Diseases are common
- Diagnostic procedures include
  - Clinical exam – endoscopy, U/S, laparoscopy
  - Biopsy
  - Fecal exam
  - Necropsy & histopathology
  - Other lab tests
Portals of entry of pathogens

- Ingestion (most common)
- Coughed up & swallowed
- Systemic blood-borne infections
- Parasitic migration
Basic Reactions of GI tract

- Cellular degeneration and necrosis
- Inflammation
- Cell proliferation and neoplasia
- Altered physiology (secretion, absorption &/or motility)
Predisposing Factors to GI Disease

- Direct exposure to environment
- Management/husbandry factors
- Contamination of feed and water
- Loose suspension in abdomen
Protective Mechanisms

- Endogenous secretions
- Resident flora and fauna
- Vomiting
- Increased peristalsis & diarrhea
- Rapid epithelial turnover
- Local immune response
Signs of GI Disease

- Dysphagia
- Vomition
- Diarrhea
- Weight loss
- Abdominal pain
- Melena
- Suboptimal performance
Diseases of Buccal Cavity

- Developmental abnormalities
- Inflammatory diseases
- Neoplasia
Developmental Abnormalities

- Palatoschisis (cleft palate)
  - Inadequate growth of palatine shelves from maxillary processes
    - Genetic (Charolais, along with arthrogryposis)
    - Toxic plants in cattle, sheep & pigs
    - Steroid administration (primates)
  - Results in aspiration pneumonia & death
- Cheiloschisis (cleft lip, harelip)
- Epitheliogenesis imperfecta
Epitheliogenesis imperfecta, bovine tongue & esophagus (above), no reaction to epithelial cell loss (left of arrow, below)

Palatoschisis (cleft palate), bovine

Cheiloschisis bilateral calf
Cheiloschisis
bilateral
calf

Palatoschisis (cleft palate),
pig

Glossoschisis, bovine
Agnathia, lamb

Brachignathia, lamb

Prognathism (prognathia), dog
Inflammation of the mouth – Some terminology

- Stomatitis – general term
- Cheilitis - lips
- Glossitis - tongue
- Gingivitis - gingiva
- Pharyngitis - pharynx
- Tonsillitis - tonsils
- Sialoadenitis – salivary glands
Causes of stomatitis

- Infectious agents, local and septicemic
- Trauma
- Chemical injury
- Auto-immune
- Systemic diseases
- Idiopathic
Stomatitis

- Important indicator of local and some systemic diseases.
- Morphologic manifestations include
  - Inflammation (redness, papules, pseudomembranes, granuloma)
  - Degeneration (vesicles, erosions, ulcers)
  - Often a combination of both
Stomatitis characterized by red, inflamed gums, cat. Notice, mixed inflammatory cells.
Vesicular stomatitis

- Could be caused by a variety of agents
- In dogs & cats:
  - Rule out auto-immune disease
  - Calicivirus infection in cats
- In food/large animals:
  - Rule out major viral diseases
Pathogenesis of vesicular stomatitis

- Epithelial damage (viral)
  - intracellular edema & ballooning degeneration → vesicles → bullae → erosions → ulcers → cellular infiltration
- Lesions in stratified epithelium
- No viral inclusion bodies
Ballooning degeneration of acanthocytes leading to vesicle (V) formation
**Pemphigus vulgaris.** Suprabasal separation due to loss of cell-to-cell adhesion (acantholysis)

Direct immunofluorescence. There is deposition of immunoglobulin along the plasma membranes of epidermal keratinocytes in a fishnet-like pattern.
Foot and Mouth Disease
FMD, Aphthous fever
(Most dreaded animal disease in the world)

- Caused by a picornavirus (7 antigenic types)
- Affects mainly ruminants and pigs
- Transmission by ingestion and by inhalation
- Infection of pharynx leads to viremia and widespread localization in epidermal sites
- Lesions only in sites subjected to mechanical injury
- Clinical signs: drooling saliva, lameness, etc.
- Highly contagious, high morbidity, low mortality except in neonates
FMD Lesions

- Mucosal hyperemia, vesicles/bullae on lips, oral mucosa, feet and teats.
- Vesicles/bullae rupture → erosions/ulcers
- Scab formation & scarification
- Myocardial degeneration & myocarditis in neonates → acute heart failure
- Complications include
  - Secondary bacterial infection
  - Hoof separation
FMD, cow. Notice epithelial flaps on gums and tongue

FMD, large ruminal ulcer, cow

FMD, lymphocytic myocarditis, calf
FMD lesions involving snout & feet. Notice separating hoofs

FMD, ouch!!!!!! my feet!!!
Vesicular Stomatitis (VS)

- Caused by a rhabdovirus (VSI & VSNJ in US)
- Affects horses, cattle & pigs
- Outbreaks in spring, summer & fall
- Insect vectors involved, most likely through trans-ovarian transmission
- Signs & lesions as in FMD but milder, not as contagious & horses are affected

Gums with circular ulcers from rupture vesicles, VS, horse
Other vesicular stomatitis

- Swine vesicular disease
  - Caused by an enterovirus (Picornaviridae)
  - Affects only swine (Europe & Asia)
- Vesicular exanthema (VE)
  - Caused by a calicivirus
  - Affected mainly swine & sea lions in US until eradicated in 1956
- Chemical irritation

![Image of a pig nose with vesicles and ulceration](image-url)
Erosive & Ulcerative Stomatitides

- **Pathogenesis:**
  - Epithelial necrosis & inflammation without vesiculation
- **Caused by specific & nonspecific agents**
  - Erosions & ulcers in stratified squamous epithelium

Oral ulcer, histo. Epithelial loss extends below basement membrane to submucosa
Erosive & Ulcerative Stomatitides

Some specific diseases/conditions

- BVD/MD
- MCF
- Rinderpest
- Peste des petits ruminants
- Bluetongue
- Herpesvirus in cats, horses, primates
- Feline calicivirus
- Uremia

Uremic ulcer, dog
Sharp, discrete erosions & ulcers, BVD

Sharp discrete erosions & ulcers, MCF

Uremic ulcers, dog

FMD ulcer with epithelial flap
Uremic Stomatitis

Pathogenesis & Lesions

**Pathogenesis**

- High blood & salivary urea → bacterial infection → high ammonia → caustic injury
- High serum blood urea nitrogen → vascular damage → thrombosis → ischemia → infarction
- Increased urea → decreased immune response

**Lesions**

- Ulcers most often near salivary ducts, around teeth with plaques & ventral surface of tongue (Affected animals often have ammoniacal odor to the breath).
Tongue from a horse with chronic renal disease

Uremic ulcers and infarcts, dogs
What is your diagnosis?