RESPIRATORY SYSTEM L-2

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1

RHINITIS (Nasal Cavity; stuffy nose)

- Inflammation of the nasal cavity
- Normal microflora – bind to sugar containing binding sites of epithelium

- **Inflammation occur**
  - Injury to mucosal surface
  - immunodeficiency states
  - Non-specific stress states – postoperative surgery
  - Viruses
  - Allergens in cattle
  - Volatile gasses, dust, dry environnent

2

According to the type of exudates, **rhinitis** (tracheitis and bronchitis) can be classified into:

- Serous -- Secretion from submucosal glands
- Catarrhal -- Secretion from Goblet cells
- Fibrinous -- Altered vascular permeability
- Purulent -- Chemotaxis for polymorphs
- Granulomatous -- Granuloma, fibrosis

Other Exudates:

Muco-purulent, fibrino-purulent, fibrino-necrotic etc.

3

- **Acute Condition**
  - Initially serous
  - Then become catarrhal
  - Then purulent
  - May be pseudomembranous, ulcerative or hemorrhagic

- **Chronic Condition**
  - Mostly proliferative
  - Less often atrophy

4

- **It occur in Diseases:**
  - Canine distemper (dog)
  - Bovine viral diarrhoea
  - Rinderpest
  - Malignant catarrhal fever
  - Blue tongue (sheep)
  - Equine influenza
  - Equine viral arteritis
  - Feline respiratory disease complex
  - Equine rhinopneumonitis

5

Horse with purulent rhinitis. Note the purulent discharge in the left nostril.

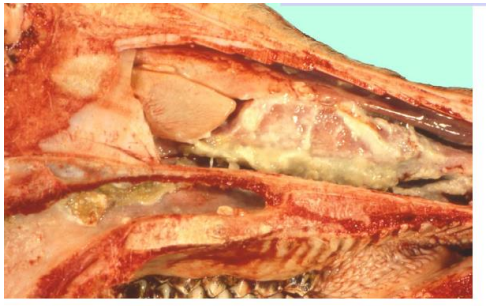
Strangles (*Streptococcus equi*) is an important equine disease that may occur as an outbreak with high morbidity (90%) but low mortality (5% > foals).

6

Viral infections can also predispose dogs to secondary bacterial rhinitis (*Bordetella bronchiseptica, E. coli, Streptococci, Staphylococci*).

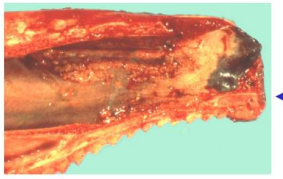
Viruses involved in upper respiratory infection of dogs include Canine Distemper (Morbillivirus), Canine Adenovirus (CAV-2), Canine Parainfluenza virus (CPI-1). CAV-2 and CPI-1 are generally acute and transient and can cause a highly contagious condition referred to as **Kennel Cough**.

7



Note a purulent exudate on the surface of dorsal and ventral conchae and meatuses. Mucosal surfaces are not hyperemic and this could raise the possibility that the exudate was produced elsewhere such as in the trachea and lung and coughed into the nasal cavity. Histology would be required here to confirm that exudation of polymorphonuclear leukocytes is taking place in nasal mucosa.

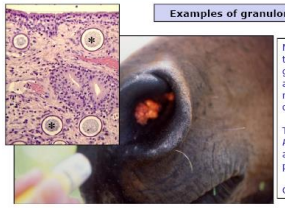
8



Note the multiple small nodules on nasal mucosa. Granulomatous inflammation always indicates chronic inflammation. Lesions like these may be caused by hypersensitivity reactions or mycotic infections.

Granulomatous rhinitis is rare and most likely of little clinical significance. If found during a physical examination, a biopsy is recommended.

Examples of granulomatous rhinitis in a Cow and a Mule

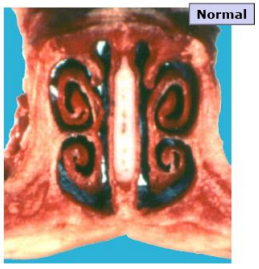


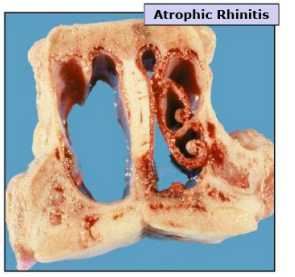
Note polypoid nodule in the nasal cavity of this mule. Although similar to a tumoral growth, microscopic examination revealed a multilobulated granoloma containing numerous round bodies with a thick capsule (see asterisks in the insert).

The microorganisms were identified as *Rhinoporidium seeberi*, a human and animal pathogen currently classified as a protist and not as a true fungus.

Courtesy of Dr. Alexis Berrocal, Costa Rica

9

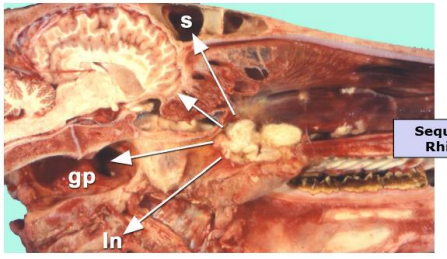




Note complete absence (atrophy) of left conchae, deviation of septum, and moderate atrophy of right conchae.

In spite of the name, inflammation in atrophic rhinitis is minimal. However, as you may expect there is notable resorption of the osseous and cartilaginous structures of the conchae. Different degrees of atrophy are shown in the next slide.

10



There are several nasty sequels to nasal infection and rhinitis. Infection can spreads:

- to sinuses causing sinusitis (**S**).
- through the "lamina cribosa" (**small arrow**) into the meninges and cause **meningitis**.
- through the Eustachian tube into the middle ear and cause **otitis**.
- through the Eustachian tube in guttural pouches (**gp**) and cause **guttural pouch empyema**.
- Via lymphatic vessels to retorpharingeal lymph nodes (**ln**) and cause **lymphadenitis**.

11

INFECTIOUS BOVINE RHINOTRACHEITIS (IBR)

Disease of domestic and wild cattle characterized by mucopurulent nasal discharge and conjunctivitis.

- **Aetiology**: **bovine herpes virus 1** (BHV1)
- **Epidemiology**
  - Viral DNA remains in the **neurons of the ganglia probably for entire life**
  - **Stress — transport and parturition** reactivation of latent infection**.**
  - The virus is distributed world-wide,
  - Not life-threatening -- secondary bacterial pneumonia --- death.
  - Apart from **ruminants, no other reservoir of BHV1 exists.**
  - **Nasal viral shedding is detected for 10-14 days**
  - Airborne transmission of BHV1 is likely only over short distances.
  - **Semen may contain BHV1 — natural mating and AI.**

12

Pathophysiology

- Virus enters – nose – replicates in mucous membranes of **URT and tonsils.**
- Disseminates to **conjunctivae and trigeminal ganglion.**
- **Genital infection – replicates in mucus memb of vagina or prepuce.**
- Incubation period — 2-4 days
- Serous **nasal discharge, salivation, fever, inappetance, and depression**
- Within a few days the nasal and ocular discharges change to **mucopurulent.**
- The necrotic lesions in the **nose** may progress to **pustules and ulcers** covered by a **pseudomembrane** that obstructs the upper airways and leads to mouth breathing.
- The primary lesion is a **focal necrosis** of nasal, laryngeal, tracheal or genital mucus membranes **— cytopathic effect (CPE).**

13

- Intense inflammatory response – lesions may **coalesce — large pustules (neutrophilic and mononuclear response).**
- Acidophilic **intranuclear viral inclusions for ~ 2 or 3 days after infection**
- May be secondary bacterial infections, for example, *Pasteurella spp.,*
- severe clinical signs due to the deeper airways being affected
- pneumonia — **mostly fibrinopurulent** with or without pleuritis that frequently follows interstitial emphysema resulting in to labored breathing
- Antibody and a cell-mediated **immune response within 7-10 days.**
- Immune response **persist for life** although may not be protective
- Maternal antibodies — **colostrums to the young calf,**
  - biological half-life of about 3 weeks

14

- May be **abortion and** a reduction in **milk yield.**
  - In aborted foetuses,

    tiny necrotic foci — in various tissues, particularly liver.
- Natural Matting — pustular vulvovaginitis or balanoposthitis.
  - mild to severe necrotic lesions in vaginal or preputial mucosae.
- **A.I.** – Endometritis can arise
- Many infections run a subclinical course
- **IBR** is on **"List B"** diseases on OIE list
  - "Transmissible diseases that are considered to be of socio-economic and/or public health importance within countries and that are significant in the international trade of animals and animal products."
- **Enables inter-country trade restrictions for IBR /BHV1**

15

Lesions

- In uncomplicated IBR infections,
  - most lesions are restricted to the upper respiratory tract and trachea.
  - Petechial to ecchymotic hemorrhages may be found in the mucus membranes of the nasal cavity and the paranasal sinuses.
  - Focal areas of necrosis develop in the nose, pharynx, larynx, and trachea.
- The lesions may coalesce to form plaques.
- The sinuses are often filled with a serous or serofibrinous exudate.
- As the disease progresses, the pharynx becomes covered with a serofibrinous exudate, and blood-tinged fluid may be found in the trachea.

16

- The pharyngeal and pulmonary lymph nodes may be acutely swollen and hemorrhagic.
- The tracheitis may extend into the bronchi and bronchioles;
- The **viral lesions** are often masked by secondary bacterial infections.
- In young animals,
  - Erosions and ulcers overlaid with debris may be found in the nose, esophagus, and fore-stomach.
  - In addition, white foci may be found in the liver, kidney, spleen, and lymph nodes.

17

Diagnosis

- signs and lesions -- Uncomplicated cases
- viral isolation.

  Samples should be taken early in the disease, and a diagnosis should be possible in 2-3 days.
- ELISA - rise in serum antibody titer also can be used to confirm diagnosis.
- HV-1 abortion can be diagnosed by identifying characteristic lesions and demonstrating the virus in fetal tissues by virus isolation, immunoperoxidase, or fluorescent antibody staining.
- PCR

18