

INTRODUCTION

The system is made up of the following: nasal cavity, sinuses, pharynx, larynx, bronchi and bronchioles, guttural pouch, alveoli, nervous and blood supplies.

Often the respiratory system is prone to disease because it is open to infection at two ends:

- (a) Directly to external during inspiration;
- (b) Filters blood thereby trapping infection and other emboli from the pulmonary artery from the right ventricle;
- (c) Direct extension like gun shots and wounds, bites, ruptured esophagus or diaphragm .

The mucosal lining is pseudo-stratified columnar with Goblet cells; lamina propria with serous and mucous glands.

Bronchioles contain non-ciliated epithelium with Clara cells.

Alveolar walls have 2 types of epithelial cells: (i) Type – I Pneumocyte (more numerous) and (ii) Type-II Pneumocyte as well as alveolar macrophages.

Functions of the respiratory system:

Gaseous exchange – most important

Smelling organs

Phonation-important in dogs: hunting and watching

Heat dissipation-panting

UPPER RESPIRATORY SYSTEM

Nasal cavity and sinuses: pathology of the upper respiratory system includes:

- i. Congenital anomalies
- ii. Circulatory disturbances

Specific diseases of the upper respiratory system:

1. Inclusion Body Rhinitis of swine

Caused by cytomegalovirus

Characterized by the presence of basophilic intranuclear inclusion bodies (INIB) in the epithelial cells.

2. Atrophic Rhinitis of swine

Infection caused by combination of viral, bacterial agents and nutritional imbalances

3. Strangles (in Horse)

Caused by bacterium *Streptococcus equi*

Characterized by bilateral purulent rhinitis, conjunctivitis, and purulent lymphadenitis

4. Glanders (in Horse and Man)

Chronic suppurative disease of horse and man (Zoonotic), occurs in Africa.

Caused by oral infection of Gram negative organism: *Burkholderia mallei* formally called *Malleomyces mallei* or *Loefflerella mallei*

Oropharynx to lymph vessels to regional lymph nodes to blood vls. Characterized by small pyogranulomatous nodules in the sub mucosa of the respiratory tract and the lungs as well as skin; ulceration of the nodules leading to 'stellate' scars in the nasal mucosa.

5. Stomatitis pneumoenteritis complex SPC (Kata)

Disease of upper respiratory tract: acute rhinotracheitis

Proliferation of the nasal epithelium

Presence of intracytoplasmic and intranuclear inclusion bodies

6. Canine distemper (Carre's disease)

Caused by paramyxovirus (morbillivirus) same group with KATA virus, measles, rinderpests, assisted by 2^o infections (specific and non-specific) e.g. *Brucella bronchosepticus*, *staphylococcus spp*, *salmonella spp* and *toxoplasma gondii*

It is a **pantropic** disease affecting all the organs of the body and eliminated from all the body secretions. It has affinity for epithelial cells (respiratory, alimentary, biliary, urinary), the skin, nervous and glia cells.

7. **Infectious Bovine Rhinotracheitis (IBR) Caused:** Herpes virus. It is **pantropic** in nature; **Bacteria complication:** common-*Mannheimia haemolytica*

- Occurs in various **forms:**
- (i) Respiratory form
- (ii) Nervous form
- (iii) Genital and
- (iv) General form.

Gross Lesions: ulcers or erosion and pseudomembranous exudates in the affected mucous membranes. Necrotic foci on the viscera and lymph nodes. **Histology:** cellular necrosis with intense leucocytic infiltration of the mucous surfaces and in foci of the parenchymatous organs. INIB

8. **Equine Viral Rhinopneumonitis (EVR)**

- EVR is a herpes virus infection causing:
- Inflammation of the respiratory tract

Lesions:

- In aborted fetus:
- There are focal necrosis in the liver, kidney and heart
- Pulmonary oedema
- Or interstitial pneumonia
- Intranuclear inclusion bodies
- Similar signs in foals

9. **Feline Viral Rhinotracheitis**

- Herpes viral disease with lesions as in IBR
- Usually complicated by common bacteria responsible for the fatality

PARASITIC INFECTIONS OF THE UPPER RESPIRATORY SYSTEM

1. *Oestrus ovis* in sheep & goats called **nasal bot** common in Nigeria and cause chronic mucopurulent rhinitis
2. *Linguatula serrata* is a tongue shaped arthropod of dogs causing low grade catarrhal lesion.
3. *Pneumonyssoides caninum* is a mite found in dog's sinuses with little or no clinical signs.

TUMOURS OF THE UPPER RESPIRATORY SYSTEM

1. Polyp-benign tumour of the mucosa of the tracts
2. Squamous cell carcinoma-malignant tumour
3. Sarcomas-from the connective tissues under the mucosae affecting the bones & cartilages in the nasal cavities.

PHARYNX AND GUTTURAL POUCHES

Usually the pharynx and the Guttural pouch are affected along with the upper respiratory system by the same agents.

Pharyngitis-inflammation of the pharynx

Tympanitis-inflammation of the guttural pouches usually gaseous distension.

Mycosis is a frequent infection of the guttural pouch accompanied by profuse nasal haemorrhage.

LARYNX AND TRACHEA

- (i) Congenital anomalies
 - (a) Hypoplasia of the epiglottis
 - (b) Mal-formation of the trachea
- (ii) Physical influences

Injuries from tracheal tubes will cause trauma leading to haemorrhage, fracture and secondary bacterial infection.
- (iii) Circulatory disturbances
 - (a) Hyperaemia
 - (b) Haemorrhage in acute septicaemia and bleeding diseases or at slaughter
 - (c) Oedema as part of inflammation or allergy
 - (d) Thrombosis in the laryngeal vessels following trauma or inflammation
- (iv) Disturbances of growth
 - (a) Unilateral or bilateral atrophy of larynxgeal muscles in horses leading to a disease called ROARING. It results from recurrent laryngeal nerve paralysis affecting mostly the left side cricoarylenoideus dorsalis muscles.

- (b) Hyperplasia of the lymphoid organs of the larynx as in Strangles in horses.
 - (c) Metaplasia of the cartilage to bone occurring in old age.
- (v) Disturbance of cell metabolism
- (a) Amyloid in the larynx of horses
 - (b) Melanosis in the laryngeal mucosa
 - (c) Calcification seen in Uraemia
- (vi) Inflammation
- Laryngotrachietis may be catarrhal, suppurative, fibrinous or granumatosus.
- Usually associated with the infection of the upper and/or lower respiratory tracts: IBR
- Sphaerophorus necrophorus* frequently invade already injured mucosa as an anaerobic organism.
- Corbacterum pyogenes* is often causing laryngeal abscesses.
- Other infections involved in laryngotrachietis are:
- (i) herpesvirus in chicken e.g. ILT
 - (ii) infectious feline enteritis
 - (iii) chronic lesion seen in T.B.
 - (iv) kennel cough: *Bordetella brochiseptica*, canine parainfluenza virus and canine adenoviruses (CAV-1 & CAV-2)

(vii) PARASITIC INFECTIONS:

1. *Capillaria aerophilia* affects the trachea and bronchi (chronic cough) of dog, horse and cats. The eggs resemble those of trichuris (whip worm) with double operculates.
2. *Crenosoma vulpis* as in capillaria
3. *Filaroides* (Oslerus) in dogs found in the submucosa nodules about the bifocation of the trachea. Only the dead ones provoke grannulomatous reaction.

PATHOLOGY OF THE BRONCHUS

1. Bronchostenosis: abnormal narrowing of the bronchus which may be caused by parasites, inflammatory exudates or due to muscle spasm as in asthma of man and horses or due to peribronchial stenosis as in the presence of a large mass.
2. Bronchiectasis: dilatation of the bronchus caused primarily by
 - (a) Chronic broncheitis
 - (b) Chronic pneumonia
 - (c) Stenosis of the bronchus (area below the stenosis)
 - (d) Congenital causesThe affected area is either cylindrical or circular filled with viscid exudates containing lots of macrophages
3. Bronchitis – usually an extension of the upper or lower respiratory disease. Here the exudates may cause obstruction of the tract.
4. Bronchiolitis – usually result in broncho-pneumonia generally caused by bacteria. There is usually atelectasis (collapse of the alvoli) or emphysema (gaseous distesion of the lung).

Infection of the bronchus is usually by inhalation or aspiration or spread from the lungs. Bronchitis could be purulent or necrotic.

In **Bronchiolitis obliterans** the bronchioles have their epithelium damaged and lumen blocked by exudates due to fibrous tissue growth.