

RESPIRATORY SYSTEM

Function of Respiratory System

- Gas exchange
- Odor removal
- Sound extraction
- Air temperature, humidity and acid-base balance regulation
- Phagocytosis of foreign particles
- Activation of the defense system
- Blood Reservoir
- It adjusts the composition of the blood to the heart and circulation or metabolizes the other bioactive material.

Causes of bleeding from nasal cavity and sinuses

- ◆ Local trauma
- ◆ Diathesis
- ◆ Parasites
- ◆ Toxication
- ◆ Acute and chronic inflammations
- ◆ Ulcer at mucosa
- ◆ Recessive genetic factors
- ◆ Infectious agents (Mycotic, viral, bacterial)
- ◆ Progressive hematoma

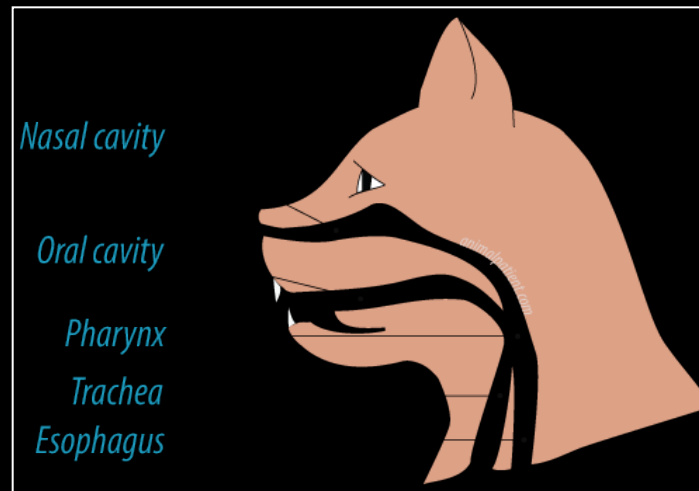
INFLAMMATION OF NASAL CAVITY AND SINUSES

Rhinitis and Sinusitis

◆ **Rhinitis** : Inflammation of nasal mucosa

◆ **Sinusitis**: Inflammation of sinuses

◆ These two forms of inflammation usually occur together, but mild sinusitis can be overlooked.



- ◆ The nasopharyngeal mucous membrane has a normal microbial flora.
- ◆ These bacteria in the mucosa of the nose and pharynx hold onto the upper parts of the surface epithelial cells and prevent the virulent microorganisms, especially the Gram (-) bacteria, from settling and colonizing them.
- ◆ That is, these factors protect the host through competitive inhibition and inhibit the entry of potential pathogens or keep them harmless.

- ◆ In the occurrence of infectious rhinitis, normal **microbial flora balance** should be present in this region.
- ◆ In the **injury of the mucosal surface**, some members of the normal flora gain pathogenic activity or, more importantly, they are affected by attachment sites and colonization and attachment of pathogenic microorganisms.
- ◆ This **protective barrier is often disrupted** in the presence of cytopathic virus, lesser pathogenic bacterial infections, irritant volatile gases, environmental changes, allergens, systemic immune deficiencies, or nonspecific stress conditions that are shaped by operations, local trauma, prolonged antibiotic therapy, low relative humidity.
- ◆ **Allergens** are important in cattle, and in lesser dogs, cats.

Classification of Rhinitis

- Rhinitis according to duration

 - Acute

 - Subacute

 - Chronic

- Rhinitis according to exudate

 - Serous

 - Catarrhal

 - Purulent

 - Pseudomembranose

 - Ulcerative

 - Hemorrhagic

- Granulomatous (Special inflammation)

Classification of Rhinitis

- Rhinitis according to severe

Mild

Moderate

Severe

- Rhinitis according to etiologic agent

Viral

Bacterial

Mycotic

Toxic

Allergic

- ◆ Most cases of significant acute rhinitis begin with serous exudation, which change in the process of the disease to catarrhal and then purulent inflammation.
- ◆ **Pseudomembranous, ulcerative, or hemorrhagic rhinitis are signs of severe damage.**
- ◆ Chronic rhinitis is most commonly manifested prolipherative changes on mucosa

Rhinitis according to the thickness of the mucosa:

In case of mucosal thickening and polyposis reproduction, **rhinitis hypertrophicans** and atrophic mucosal **rhinitis atrophicans**.

◆ **Chronic rhinitis** may cause progressive fibrosis of the lamina propria with atrophy of the glands, and atrophy with focal *squamous metaplasia of nasal epithelium*. Sometimes atrophic rhinitis is formed in large dog breeds

Serous rhinitis (*Rhinitis serosa*)

◇ During the initial serous stages of rhinitis, regardless of the inciting conditions

Causes :

- ◇ Irritative dust or matter
- ◇ Cold weather
- ◇ Initial stage of viral infections

Macroscopically :

- ◆ The mucosa is swollen
- ◆ Gray to red discoloration depending on the degree of hyperemia

- ◆ Histologically, the epithelial cells are normal or show hydropic degeneration and loss of cilia. Goblet cells and submucosal glands are hyperactive.
- ◆ The secretion is a thin, clear seromucin, which contains a few leukocytes and epithelial cells.
- ◆ The underlying lamina propria is edematous and sparsely infiltrated by inflammatory cells.
- ◆ The swelling of the mucous membrane tends to cause mild respiratory discomfort and the familiar sneezing and snuffling.

Catarrhal rhinitis

(Rhinitis catarrhalis)

- ◆ It is a further form of inflammation.
- ◆ Serous rhinitis occurs within a few hours and days.
- ◆ Catarrhal inflammations usually follow bacterial infections.
- ◆ In addition to serous secretion there is a severe mucus formation, which is shaped by the increased activity of goblet cells and mucous glands.

Macroscopically

- Severe hyperemia in the mucosa
- Edema
- Mucosal thickening (due to edema and hyperemia)
- Mucous exudate is thick, opaque or semi-transparent due to epithelial cells with leukocyte and desquame.
- In fibrin and blood can sometimes be found.

Microscopically

- Severe hyperemia
- Edema
- Mucous exudate, leukocyte and desquame epithelial cells, sometimes fibrin and blood
- Regenerative hyperplasia in living epithelium
- Clear hyperplasia in goblet cells in chronic cases

Purulent rhinitis

(Rhinitis purulenta / suppurativa)

- ◆ It is a form of inflammation characterized by more severe deterioration of the nasal mucosa and a large amount of neutrophilic exudate.
- ◆ This inflammation is formed following various bacterial infections in subacute and chronic cases.
- ◆ Usually there are severe injuries to the mucosa, necrosis and secondary bacterial infection.

Macroscopically

- A thick and opaque exudate is present on the mucous membrane of the rhinitis.
- This exudate shows a color change between white, green, brown depending on the type of bacteria and the cells in the exudate.

Macroscopically

- In severe cases, nasal cavities were completely filled with exudate.
- In these cases, ulceration is common.

Microscopically

- Epithelial cells have different degree of necrosis.
- There may be regeneration of living epithelial cells.
- There is intense neutrophil infiltration in the submucosa and mucosa and there are exudate plaques on the mucosa.
- Neutrophils are also found to migrate between epithelial cells.
- Components of this type of exudate may also form abscesses and rhinitis apostematosa occurs.

Pseudomembranose rhinitis (*Rhinitis pseudomembranecea*)

- ◆ It is characterized by severe bacterial infections in domestic animals.
- ◆ Vascular permeability is also caused by injuries that cause significant impairment.
- ◆ This form of inflammation may be fibrinous (croupous or pseudodiphtheric) or fibrinonecrotic (diphtheria).

- ◆ These inflammations are characterized by excessive exudation of plasma fibrinogen and its coagulation into fibrin.
- ◆ The fibrin accumulates on the surface and forms a separate exudate layer (pseudomembrane).
- ◆ If this exudate is removed, it is fibrinous rhinitis if there are some points of adhesion with the underlying mucosa.

- ◆ If there is severe necrosis and the exudate is firmly adhered to the underlying tissue, if it breaks and ends with bleeding, it is called **fibrinonecrotic rhinitis**
- ◆ The Word of Diphtheria comes from human medicine, describing a severe destructive inflammation caused by the necrosis bacillus in the respiratory mucosa.

Microscopically

- Perivascular edema and fibrin
- Neutrophils infiltrating the mucosa
- Exudate plate composed of necrotic cell debris, leukocyte and fibrin strands of defective epithelium
- *F.necrophorum* infections, which are caused by severe bacterial infections that cause fibrinonecrotic rhinitis, form a dry yellowish membrane on the mucosa.

◆ In some cases, hemorrhagic or ulcerative inflammation (Rhinitis haemorrhagica - ulcerosa) is characterized by bleeding and ulcers.

Granulomatous rhinitis

(Rhinitis granulomatosa)

- ◆ This reaction is characterized by infiltration of macrophages, lymphocytes and plasma cells in the mucosa and submucosa.
- ◆ In some cases, inflammation creates polypoid nodules. In severe cases, they obstruct the nasal tracts.
- ◆ Smaller ones are harder, larger ones are crisp or gelatinous.

- ◆ Histological structures are specific for the disease.
- ◆ It is usually shaped against specific factors and some cases of systemic mucosis, tuberculosis and foreign bodies can be counted.
- ◆ Sometimes the etiology that causes granulomatous rhinitis cannot be decided.

Chronic nonspecific rhinitis

- ◆ Rhinitis is usually a part of generalized disease events.
- ◆ Recently, specific conditions have been identified in which the main lesion is rhinitis.
- ◆ Chronic, nonspecific rhinitis is an important phenomenon in dogs. It is less common in cats.
- ◆ Sometimes, this case is expressed in lymphoplasmacytic rhinitis because of the presence of lymphocytes and plasma cells in inflammatory cells.

◆ Idiopathic lymphoplasmacytic rhinitis is an important condition in the dog, and to a lesser extent in the cat.

◆ In dogs, the clinical disease may be either unilateral or bilateral, although histologic lesions are usually bilateral.

Macroscopically

- Chronic unilateral or bilateral mucopurulent hemorrhagic discharge, infiltration of the nasal mucosa causing diffuse or polypoid thickening
- Obstruction of nasal passages

Microscopically :

- ◈ Hyperplasia at glandula
- ◈ Ulcer on the mucosa and hyperplastic and metaplastic changes on mucosa
- ◈ Edema
- Lymphocyte and plasma cell infiltration

Allergic rhinitis

- ◆ Allergic rhinitis is observed sporadically in dogs, cats, and horses.
- ◆ The disease in *dogs* is diagnosed on the basis of oculonasal discharge, sneezing, nose rubbing, head shaking, and perhaps epistaxis, and the *presence of eosinophils in nasal exudate*.
- ◆ *There is no definitive information on either the pathological or immunological basis of the condition.*

◆ *Cattle* and occasionally *sheep* develop a seasonal rhinitis that in its clinicopathological features is consistent with an allergic pathogenesis.

◆ Some evidence has been provided that affected cattle are allergic to pollen antigens.

◆ A familial predisposition has been reported. It occurs chiefly in the summertime when the pastures are in bloom.

◆ Affected animals have nasal discharge, lacrimation, sneezing, and evidence of nasal itching.

- ◆ The nasal mucosa is pale and thick from edema fluid, and mucosal erosions may be visible in the rostral nares.
- ◆ Eosinophils and mucus are a prominent component of the exudate.
- ◆ *Microscopically, the surviving nasal epithelium is hyperplastic or eroded and is infiltrated by eosinophils.*
- ◆ The glandular epithelium can be hypertrophic and excessive mucus is produced.
- ◆ In more severe cases, in which there is extensive superficial diphtheresis

At the end of Rhinitis

◇ Generally, healing is seen except granulomatous rhinitis.

◇ **Bronchopneumonia** or lung apostematosa are occurred result of aspiration of exudate If the inflammation is locally affected, **sinusitis, facial osteomyelitis** or **meningitis** are occurred

Sinusitis

- ◆ Inflammation of the paranasal sinuses often goes undetected unless it has caused facial deformity or a fistula in the overlying skin.
- ◆ Sinusitis is of most significance in the horse because of the size and complexity of its paranasal sinuses and the compounding effects of limited drainage and tendency for periodontitis to extend to sinusitis.
- ◆ Sinusitis is very common in sheep as a response to larvae of *Oestrus ovis*.
- ◆ It also follows penetration of infection in dehorning wounds, fractures, and periodontitis.

- ◆ **Seromucinous sinusitis** may occur in viral infections of the upper respiratory tract, but it is not usually detected in routine diagnostic pathology samples.
- ◆ **In acute catarrhal or purulent rhinitis, the mucosal swelling tends to occlude the orifices of the sinuses and impair drainage.**
- ◆ **The secretions and exudates then accumulate and render chronic purulent sinusitis almost inevitable.**
- ◆ **The histologic features of sinusitis are similar to those of rhinitis.**

Complications :

- ◆ The *accumulation of seromucinous secretion* is referred to as **mucocele**,
- ◆ The *accumulation of purulent exudate* is referred to as **empyema of the sinus**.
- ◆ It is also less likely to drain and resolve spontaneously and therefore more likely to cause **epithelial atrophy and metaplasia**, and distort the bony walls of the sinuses by **pressure** or **osteomyelitis, meningitis**

Coexisting Diseases with Rhinitis in Horses

- ◆ Glanders (Farcy, Malleus, Dries, Ruam)
- ◆ Pseudomalleus (Yalanci ruam)
- ◆ Gourme
- ◆ Streptococcal infections
- ◆ Equine viral rhinopneumonitis
- ◆ Equine influenza

Glanders (*Malleus*, Ruam)

Etiology :

◇ Gram (-), aerobic bacillus

Burkholderia mallei (*Pseudomonas mallei*,
Malleomyces mallei, *Leofferella mallei*)

Host Range :

- *It is a disease of the equidae.*
- *Glanders can also be seen occasionally in humans (zoonoses) and carnivores (lions, tigers, dogs, cats) eating horses.*
- *Goat and sheep contact is susceptible to infection, while cattle and pigs are insensitive.*

◆ With the increase in **motorized vehicles** and the **application of serological diagnostic methods**, eradication programs were observed to decrease rapidly all over the world.

◆ But it still exists in some countries of Eastern Europe and Asia.

◆ In our country, although it was endemic until 1970's, it started to be almost not seen with conscious eradication programs after these years.

The properties of the agent and transmission:

- **The agent is sensitive to external conditions.**
- **Infections are transmitted directly and indirectly by excretion and discharge of sick animals.**
- **Contamination is probably caused by the oral route and by this way, typical chronic respiratory disease can be generated in experimental infections.**

◆ In intranasal and intratracheal inoculations, acute disease occurs.

◆ Aerogen infection is also mentioned.

◆ The penetration of the agent from the nasal mucosa and skin wounds is insignificant.

- ◆ The disease is usually **chronic in horses** and is usually seen in the skin and nasal mucosa lesions and currents.
- ◆ In horses where acute disease is shaped and usually in donkeys, the agent spreads to many tissues and comes out with the stool, urine, saliva and tears.

Pathogenesis:

- There is not enough information to fully explain the pathogenesis.
- As a rule, the nose and lungs always come from the secondary way.
- The nasal form is usually shaped as secondary, ie hematogenous, whether it is the causative agent, whether by means of either an alimentary or an aerogen.
- It is insignificant for the agent to enter the nasal mucosa from wounds.
- The skin form develops from the respiratory tract, whereas the skin rash develops from the skin.
- Other organs are spread out here.

- ◆ The agent with oral route passes into the lymph nodes through the pharynx and possibly the intestinal mucosa.
- ◆ The agent is proliferated or destroyed in this focus.
- ◆ It goes through the lymph nodes from the lymph nodes to the lungs.
- ◆ It causes limited cell infiltrations in the lungs.
- ◆ Sometimes they remain in this stage and even heal (primary malleus).
- ◆ In most cases, it goes to other organs, especially the nasal mucosa and makes rhinitis malleosa.

Lesions of chronic glanders in horses are seen 3 form
:

Pneumonia malleosa----- Exudative / Nodular

Rhinitis Malleosa ----- Ulcerative / Nodular

Dermatitis malleosa----- Ulcerative / Nodular

- ◆ During the progress of the disease, one form was passed from one form to another and it was observed that an animal showed three forms.
- ◆ Three forms of the disease are formed together with the acute form in donkeys and the exacerbation of chronic disease in horses.

Rhinitis malleosa

Macroscopic Findings:

- Nasal cavity lesions begin as pyogranulomatous lesions in the submucosa.
- Typical nose lesions are seen in the submucosa as multiple small nodules, surrounded by a hyperemic zone.
- Nodules can be seen as single or common lesions.

- ◆ The center of the nodules melts, the mucosa becomes necrosis, and ultimately, **the primary ruam ulcers (lenticular ulcers)** are shaped as if they are perpendicular to the edges and perforated.
- ◆ They combine with each other to form **secondary ulcers (gnawed ulcers)** made of granulated tissue with raised edges.
- ◆ Then, new generation nodules and ulcers are formed.

- ◆ The ulcers contain a sticky exudate in which plenty of agents are present.
- ◆ In mild cases, a granulation tissue is first formed in the place of ulcers.
- ◆ Then the collagen fibers increase and shrink, the star-shaped fibrous scar tissue (ruam scatrixi) occurs.
- ◆ It is possible to see nodules, ulcers and scatrix at the same time.
- ◆ The number of lesions varies from event to event.

- ◆ In mild cases, several nodules are seen in the posterior part of the nasal cavity (especially in the septum nasal), whereas in the anterior part of the nasal cavity there is only hyperemia and mucus.
- ◆ In severe cases, the lesion is found on all sides.
- ◆ Perforation is also shaped in the septum.

Microscopically:

- The first microscopic finding is the formation of hyperemia and inflammatory thrombosis in the veins (forming the hyperemic ring around the nodule), as it comes from the active secondary way to the nasal mucosa.
- Tissue contains neutrophil leukocytes with dense cell infiltration and hemorrhagia.
- Since the nuclei of most neutrophil leukocytes are fragmented (karyorrhexis), these regions are in a coal-sprinkled appearance
- Karyorrhexis is considered a characteristic finding for the diagnosis of the ruam.

- ◆ At the stage of ulcers, tissue loss occurs from the epithelial level to the submucosa.
- ◆ As the event progresses, histiocytes increase alongside neutrophil leukocytes.
- ◆ Macrophages consist of epithelioid cells and partly giant cells.
- ◆ There are lymphocytes and fibrocytes and fibroblasts on the outer surface.
- ◆ As the event gets older, the granulation tissue increases, the collagen is enriched and the scar tissue is formed.
- ◆ In the ruam, submaxillar and retropharyngeal lymph nodes, lymphangitis, nodules in acute events, and diarrhea in chronic events are seen.

Laryngeal lesions in glanders:

- **Lesions have lesions similar to those of the nasal cavity.**
- **They spread until cartilaginous, causing focal necrosis.**
- **Swallowing and breathing difficulties develop due to glottis edema.**

Trachea lesions in Glanders:

- **Tracheal lesions are usually ulcerative and rarely occur as pyogranulomatous nodules as longitudinal in the mucosa.**
- **These are usually caused by the opening of the lung form into the bronchi and bronchioles.**
- **These lesions are characterized by granulation tissue consisting of epithelioid and giant cells.**
- **Plasma cells is also very noticeable in the field .**

Pneumonia malleosa

- ◆ Pulmonary lesions are acute or chronic according to the virulence of the agent and the reaction of the organism and occur with exudative or productive (granulomatous) inflammation.
- ◆ The lympho-hematogenous pathway to the lungs is spread by lymphogen and, less, by bronchogen route.
- ◆ In the lymphocyte spread, a ruam node is formed where it comes from, and then it is resorptive with the lymph nodes (resorptive ruam node).
- ◆ In bronchogen proliferation, the progressive and enlarge lesion is opened to the bronchi, and in this spread the lesions related to the bronchi, trachea and larynx are formed.

- ◆ The benign lesions of the lungs are usually typical malleus nodules.
- ◆ These are seen as milier or larger nodes (2-10 mm) on all sides of the lung.
- ◆ They may have spread to one or both lungs.
- ◆ These foci become more prominent under pleura.
- ◆ These lesions are exudative or productive according to their morphological structure.
- ◆ Another aspect of the lung gland is the form of a lobular gland (pneumonia malleosa) characterized by diffuse pneumonia or diffuse purulent bronchopneumonia in some acute cases.
- ◆ In this case, it covers part or all of a lobe. This may be exudative or productive.

- ◆ Ruam lesions with nodular exudative type begin as a hemorrhagic confined focus under the pleura or in the lung section.
- ◆ This focus is shaped as an exudative nodule from pea to hazelnut size.
- ◆ In the middle of these foci is a small, blurred yellow color, with a dry core, and a dark red hyperemic ring around it.

- ◆ In the **microscopic examination**, three regions are distinguished in these nodules.
- ◆ In the middle, there is a region of intense neutrophil leukocytes that cover the small alveolar group.
- ◆ It is noteworthy that the nuclei of neutrophil leukocytes undergoes karyorrhexis as an introductory finding in the middle region.
- ◆ The surrounding lung tissue has hyperemia, neutrophil leukocyte and fibrin-rich inflammatory edema.
- ◆ In the other lung regions, there is hyperemia in the vessels.

- ◆ In microscopic examination, calcium salts precipitate into the middle of such lesions.
- ◆ However, this is an incomplete calcification.
- ◆ Neutrophil leukocytes that are still undergoing karyorrhexis in these calcification regions are selected.
- ◆ They also translate outermost epithelioid cells and single Langhans type giant cells and lymphocytes.
- ◆ These lesions are not confined to fibrous tissue, as is the case with outermost productive ruam.

Nodular / Product type

- **It is more common in the endemic areas of the disease.**
- **This starts with a hemorrhagic focus.**
- **This is followed by the formation of a nodule from milier to nut size.**
- **Small ones can be large, while large ones can be single.**
- **This type of nodules pus does not occur.**
- **Calcification and necrosis may occur in the middle of the old nodules.**
- **In the microscopic examination, neutrophil leukocytes undergoing karyorrhexis in the middle of the nodules are characteristic of the disease.**

- ◆ In the center and around it, histiocytes, epithelioid histiocytes and giant cells are selected.
- ◆ There is also a capsule made of connective tissue.
- ◆ Calcification increases in old lesions.
- ◆ Environmental alveoli are generally empty.
- ◆ This is the appearance of productive glanders, granulomatous appearance of inflammation.

Lobular malleus

- It covers a larger area or whole lobule.
- This is acute exudative and chronic productive form.
- It can be found either alone or together with nodules and milier lesions.

Exudative lobular malleus

- It starts in one or several lobes and spreads rapidly.
- The lobes are a color ranging from gray to dark red.
- It is prone to fragmentation.
- It is thin and granular.
- If there is hemorrhagie, it takes the color of chocolate.
- When the softening areas that are irradiated open to the bronchi, caverns are formed in their places.

Microscopically:

- In these regions, purulent bronchopneumonia is encountered.
- There is an exudate in the alveoli that is made of karyorrhexis neutrophil leukocytes.
- Necrosis in the tissue results in melting.
- The exudate opens to bronchioles and bronchi.
- The caverns remain in place.

Cutaneous Form

(*Dermatitis malleosa*)

- ◆ The skin form is called "farcy».
- ◆ In general, the nose and lung ruam is formed by lympho-hematogen.
- ◆ The primary skin ruam is rarely occurs at the end of external injuries.
- ◆ The side of the chest is more localized on the skin, especially on the abdomen and especially on the extremities in the posterior extremities.
- ◆ It is also seen in carnivores, not only in horses.

Macroscopically:

- Skin lesions of horses are characterized by tubular thickening of the subcutaneous lymphatic vessels.
- On these lymphatic vessels, arranged nodules such as single or pearl beads are formed on the skin.
- The middle of them is necrosis and becomes irrigated and when the skin is opened to the surface, the edges are raised and the ulcers appear with granulation tissue at the bottom.
- Around the granulation tissue occurs.

- ◆ The exudate is also called «huile de farcin» because it comes from the appearance and consistency of exudate in olive oil.
- ◆ In the surrounding subcutaneous connective tissue, phlegmon is also formed (malleus phlegmone).
- ◆ Then there is an increase in connective tissue in these regions and the leg takes the form of the elephant leg. This is called **elephantiasis malleosa**.
- ◆ Regional lymph nodes are swollen.
- ◆ In the latent form of the disease, external findings cannot be selected.

Microscopically:

- In the middle of the karyorrhectic neutrophils, around the histiocytes and epithelioid histiocytes, sometimes giant cells and outermost connective tissue capsule of the known malleus nodule is seen.
- In addition, lymphatic vessels in the throat thrombosis, thrombotic-purulent lymphangitis malleosa, edema, phlegmon and connective tissue is seen in the environment.

Lesions of Lymph Nodes in Glanders

Macroscopically:

- In lymphatic vessels, there are changes related to exudative and productive ruam in lymph nodes of the region, in addition to pus lymphangitis.
- Lymph node gets yellowish color.
- Nodular structures are seen.

Microscopically:

- Local necrosis, fibrin and leukocytic infiltration are encountered.
- Then the lymph node gets a gray color.
- There are microscopic findings similar to those in lungs in productive nodules.

Differential Diagnosis at Ruam

◆ Strangles and crupous rhinitis

◆ Lymphangitis epizootica

◆ Tumor , tuberculosis

◆ The diagnosis is made by microbiological and mallein testing, especially in chronic cases.

Pseudomallei (*Melioidosis*)

- ◆ Melioidosis is mainly a disease of rodents.
- ◆ Rats, especially guinea pigs, rabbits, as well as rodents, such as horse, cattle, sheep, goats, pigs and dogs are seen in domestic animals.
- ◆ It could be lethal to humans occasionally.
- ◆ The virulence of the regional species is different and the racial difference plays a role in the susceptibility of sheep and goats.
- ◆ The disease occurs in the form of small outbreaks in spontaneous or endemic areas.
- ◆ The disease is common in tropical regions with southeast Asia. It has been seen in some western European countries and Australia.

- ◆ The disease is caused by *Pseudomonas (Malleomyces) pseudomallei*, which is closely associated with the glanders.
- ◆ The main source of infection is rat.
- ◆ The causative nasal discharge is secreted by secretions and excretions.
- ◆ It remains alive in endemic areas for 30 months in soil and in water and is incidentally pathogenic.
- ◆ The most important route of infection is digestion.
- ◆ It has also been reported by inhalation.
- ◆ It can pass through insects as it is infected with wounds in the skin.

- ◆ Following infection, the pyemia is shaped and follows the formation of similar abscesses in many tissues, especially lymph nodes, spleen, lungs, liver, joints and nervous system.
- ◆ The lesions vary according to the severity of the case.
- ◆ Acute progression in the acute course of the disease and chronic appendages are seen in long-lasting events.
- ◆ Melioidosis is similar to the glanders of horses.
- ◆ Dogs may have skin abscesses and epididymitis in addition to findings in other organs.

Strangles (Gurm)

- ◆ Strangles is an acute, contagious disease of horses characterized by suppurative rhinitis, lymphadenitis (mandibular and retropharyngeal) and occasional internal emboli.
- ◆ The disease is caused by *Str.equi*.

- ◆ In pathogenesis, adherence of the agent to epithelial cells plays a role.
- ◆ The upper airway enters the epithelial cells, especially in the soft palate and the pharynx.

- ◆ The incubation time in gourm is 3-4 days. However it can be as short as 2 days or as long as 15 days. Clinically, fever, mild cough and nasal discharge are seen.
- ◆ Nasal discharge is bilateral and its structure changes from serous to catarrhal within a few days and then to purulent.
- ◆ Typical cases of inflammatory swelling of the head and neck lymph nodes also have absolute catarrhal conjunctivitis.
- ◆ Submandibular and retropharyngeal lymph nodes are the first affected and usually the most fevered organs.

◆ Typical and prominent signs of lymphadenitis are the rupture of abscesses after 1-3 weeks after the onset of infection.

◆ Before the rupture, serum is removed and the hairs stick.

◆ The pus is sticky, cream-like and yellow-white in color

◆ Abscesses on lymph node are unchanging signs of strangles, but diagnosis can rarely be made in their absence.

◆ Nasal lesions are nonspecific purulent rhinitis. In the curves of the cones, a large amount of cream-like yellow pus is collected which can cause temporary distortion.

◆ The mucosa is edematous, hyperemic and occasionally ulcerated.

◆ The typical course of this saved strangles is very significant.

- ◆ However, mild and more severe symptoms can be observed.
- ◆ Complications occur in 20% of clinical patients in a mixed age group.
- ◆ In elderly horses, the disease is more mild and catarrhal rhinitis and pharyngitis are formed, abscesses of lymph nodes are absent, or abscesses formed are sterile and encapsulated.

- ◆ In severe cases, the infection spreads to the paranasal sinuses and forms chronic empyema in these spaces.
- ◆ In the connective tissue of the nose, pharynx or throat, severe cellulitis may be formed.
- ◆ Retrofaringeal abscesses can be opened into the pharynx and the pus is aspirated into the lungs (atypical strangles).
- ◆ Occasionally, metastatic abscesses are found in the liver, kidney, synovial membranes and brain.

- ◆ The most affected internal organs are mediastinal and mesenteric lymph nodes.
- ◆ Their abscesses are large, but rupture is very rare.
- ◆ Suppurative inflammation spreads to neighboring serous membranes and forms purulent pleuritis or peritonitis.
- ◆ The 2 important results are; purpura hemorrhage and paralysis of the cranial nerves. This results in laryngeal paralysis (hoarse), facial nerve paralysis or Horner's syndrome.

Equine viral rhinopneumonitis

- ◆ Equine herpesvirus (EVH) causes abortion in newborn foals, fetal lysis (mummification, stillbirths) and race horses (EHV-4) with mild respiratory infection or mares (EHV-1).
- ◆ Infections with EHV-4 are seen in autumn in newborn foals.

Clinicopathological Findings:

- It is characterized by mild fever, serous or catarrhal rhinitis and conjunctivitis.
- Rarely, diarrhea and edema are seen in the joints. The respiratory pattern of the disease is temporary.
- Primary lesions of the nasal mucosa and lungs are rarely seen in necropsy.
- However, if there are secondary bacterial complications, rhinitis, pharyngitis and bronchopneumonia may be formed.
- End-of-death intranuclear inclusions are difficult to see.

Equine influenza

- ◆ This is the most common upper respiratory tract disease of horses and is usually seen in 2-3 elderly race horses.
- ◆ Influenza type A (A / equi-1 and 2) is responsible for its etiology. Type B role was not detected in infection.
- ◆ Influenza in horses, as in human influenza, is also a mild disease.
- ◆ However, it may cause severe bronchointerstitial pneumonia, including occasional pulmonary edema.
- ◆ Sometimes it is complicated by subclinical bacterial bronchopneumonia formed by opportunistic organisms found in the normal flora of the upper airway.

- ◆ Equine rhinovirus, adenovirus and parainfluenza virus from other viruses in horses may cause mild and transient upper respiratory tract infection unless they are complicated by secondary pathogens.
- ◆ Lethal adenovirus infections that cause severe pneumonia or enteritis are commonly seen in horses with poor defense systems, especially in hereditary Arabian horses with deficiency.