

PNEUMONIA

PNEUMONIA

**The general term that
defines the inflammation of
the lung**

**Inflammation
occurs,**

in

alveoli ,

**bronchiole,
bronchus,**

and/or

interstitium

It is characterised exudation

or

cell proliferation.

**Pleurapneumonie is mentioned in the
pleura (pleuritis et pneumonie or
pleuritis et bronchopneumonie'den)
together with the lungs.**

Fibrinous pneumonie is like this.

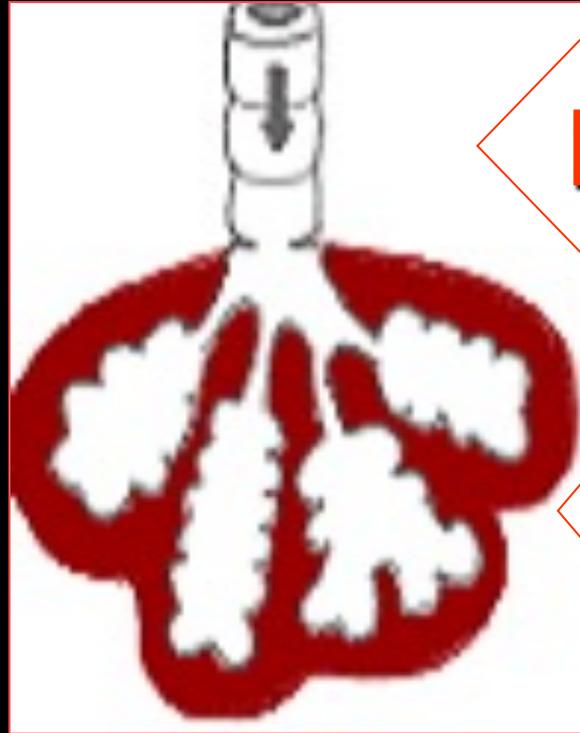
ETIOLOGY

AND

PATHOGENESIS

Lung respiratory tract to the external environment; pneumonia develops easily because it is connected to the internal environment by blood and lymph vessels.

INFECTION



Aerogen

Hematogen

Lenfogen

It is also possible to spread the inflammation of the surrounding tissues directly.

ETIOLOGY

Polyfactorial

- It is also possible to spread the inflammation of the surrounding tissues directly.
- PHYSICAL - cold, hot, especially humid cold weather; dust in the air-
- CHEMICAL - toxic substances eg. irritant gases, toxins coming into the lungs by the digestive tract
- ALLERGIC - flower pollen, mushroom, etc.
- INFECTIOUS-virus, bacteria, fungi, protozoan, helminth agents play a major role in etiology.

The main cause of pneumonia in animals is INFECTION!

Allergens, chemicals are in lower rank.

Chemical-toxic substances and physical effects are usually predisposing factors.

- Predisposing factors take a significant place.
 - Some of them originate from the environment and some from the host. A further infection also makes the lungs predisposed.
 - In particular, facultative pathogens that are taken from the outside or in the airways ensure that the factors are activated.

Enviromental Factors

*Seasonal
or
sudden
meteorological
changes*

Physical effects
such as cold, hot air.

It is more predisposing
factor.

Sudden weather changes
also break the body's
resistance in such cases,
respiratory tract infections
increase.

- **cold-humid air**
- **disrupts the defense mechanism of the airways.**
- **Ex: The cilia of epithelial cells that line the airways remain motionless. The secretion of the glands is reduced.**
- **In this case, facultative pathogen microorganisms that can be present in the nasal cavity and external or mouth are activated.**

Maintenance and feeding deterioration (inadequate, malnutrition, feed exchange)

It breaks the body's natural and special (immune) resistance. Ex. If protein is not taken, immunoglobulin is not sufficient in addition to other defects in the body

The disorder of shelter hygiene facilitates the droplet infection of animals in the shelter.

The cleaning of the base of the barn, its mixing with the urine, causes the irritation of the respiratory tract by mixing the ammonia from the urine into the inhaled air.

Transport

Especially in the long ship and train journey, animals are kept in a crowded condition, they are not fed well, they are not protected from weather conditions; Respiratory, digestive tract infections indicate.

The difference between the old and new places of animals also breaks the body resistance.

Factors of Host

Pneumonia is related to the host of

- * sort,
- * age (important),
- * constitution

The risk of pneumonia increases in adults with impaired immunity or natural resistance.

**It is more common
in pups (immunity
has not developed
sufficiently).**

**It is common in the
elderly because the
lungs lose their
elasticity**

Another disorder in the bodies

**If there is pulmonary edema associated with chronic circulatory disorder;
bacteria-rich edema fluid in bacteria easily produces and results in pneumonia.**

In patients with chronic heart failure, pulmonary edema may result in pneumonia and may result in death.

**After infectious agents enter
the airway and make
pneumonia in the lungs;**

**it can spread to other organs
and make related disorders.**

The amount and type of agent,
whether the toxin is involved,
plays a role in the pathogenesis of
infectious pneumonia

.

Infectious pneumonias can draw different morphological pictures.

Because

it is composed of only one agent and it is the formation of pneumonia with the addition of more than one factor.

In this case :

The primary (initial) factor initiates pneumonia. Secondary agents or agents are added.

In this case, the morphological change of the primary agent as well as the changes related to the secondary interfering factor or factors are present.

Or changes in primary infection are covered by secondary infection.

Primary lesion
related to virus
is interstitial
pneumonia at canine
distemper

Bordetella bronchiseptica (secondary) is changed to type of pneumonia. Catarrhal or other bronchopneumonia is occurred.

It can be shaped by the simultaneous addition of more than one factor, mixed infection is mentioned.

The morphological table is confused as each factor is simultaneously oriented to shape its morphological change.

it becomes difficult to enlighten the etiology.

The event is only illuminated by microbiological examination.

*Spreading
of
Inflammation
in the lung*

ENDOBRONCIOLAR
and
PERIBRONCIOLAR
SPREADING

PARTIALLY
INTERALVEOLAR SPREADING

Endobronchial spreading:

It is occurred end of bronchitis.

The bronchiol, where the bronchus ends with exudate aspiration, reaches up to the alveoli through the ductus alveolaris.

In this type of pneumonia, the inflammation is no spreading a lobe.

Peribronchial Spreading

**Inflammation
(exudate), bronch,
bronchi around the
bronchiole wall and
from there to the
alveoli**

This is due to the failure of the exudate to be resorbed as a result of the occlusion of the vessels by the exudate of the bronchi .

The spread is UNINTERRUPTED (CONTINUED).

One lobule of a lobe is inflamed while the other bronchial lobe is intact.

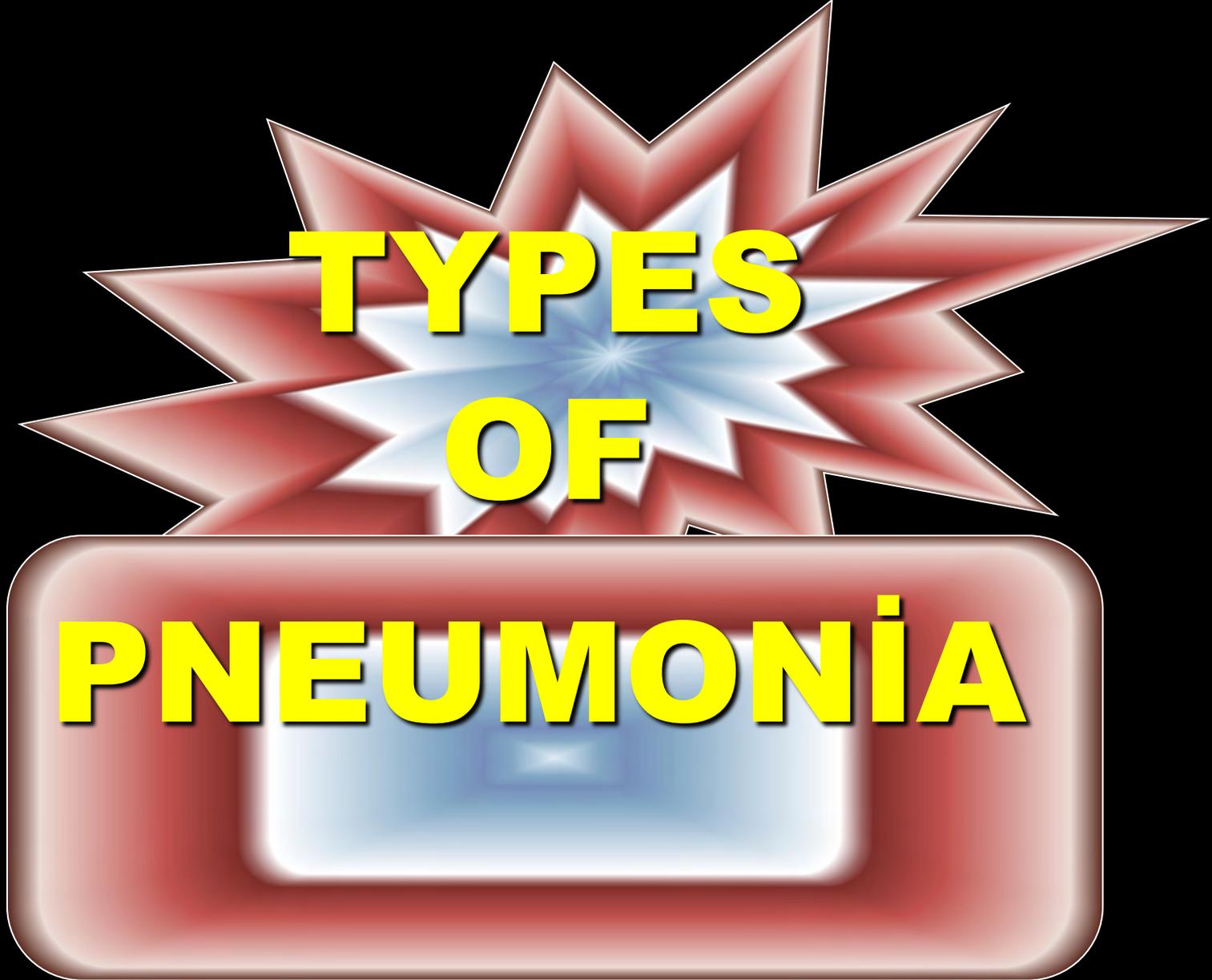
So this type of pneumonia is **INTERRUPTED**

However, if the bronch is occluded, it passes through the peribronchial or interalveolar passage to the other adjacent lobules.

Interalveolar spread

It's rare.

Exudate is passed through other alveoli and bronch with Kohn pores in the alveolar wall as a result of obstruction of bronchi



**TYPES
OF
PNEUMONIA**

Pneumonia according to the time

Acute pneumonia

Chronic pneumonia

According to distribution :

Lobular pneumonia

**Inflammation on one or
more lobules of lobes;**

Lobar pneumonia

**Inflammation on one or
more lobes**

**According to histologically location at
many years ago**

Pneumonia : Inflammation of alveoli,
bronch and bronchiol

Pneumonitis: Inflammation of
perivaskular, peribronchial, interlobular
areas (interstitium) - **interstitiel pneumoni**

Specific classification is made of **type, location, distribution, time** of inflammation

Bronchopneumonia catarrhalis acuta,

Pneumonia (bronchopneumonia) fibrinosa

Alveolitis : Inflammation of alveoli (alveolar pneumonia, parenchymatous pneumonia)

But in this case, bronch and bronchioles are continuously affected with alveoli (bronchopneumonia)

**Exudative
and
proliferative
pneumonie**

Proliferative pneumonia

Although it refers to the inflammatory events in which cell growth takes place, it is not understood what its main morphology is and why it originates.

Because of these events:

- * Alveolar pneumonocyte IIs proliferate;
- * In some cases, mononuclear cells infiltrate in interstitium in acute events; connective tissue cell proliferation is seen in the chronic period;
- * In one part the periphery of bronchus surrounds mononuclear cells (lymphocyte series and partly macrophages)

Peribronchitis or peribronchiolitis nodosa shaped by the intensification of connective tissue cells around the bronches and bronchioles

Fibrosis characterized by increased interstitium connective tissue in interstitial or other pneumonia is a change in chronic events

Pneumonia were also classified by considering some features. A consistency which is of macroscopic finding is the definition of indurative pneumonia.

**In fact, it is not a separate
pneumonie.**

**It relates to fibrosis, which
is characterized by
chronicity of various
pneumonia.**

**Firstly, the increase of
connective tissue, and then
the concentration of
collagen fibers,
pneumonia in the lungs is
caused by the stiffening of
the areas held more rigidly
during palpation.**

Enzootic pneumonia, enzootic bronchopneumonia

Pneumonia is another specific definition that is inspired by the frequent occurrence in some herds, in some herds.

The cause of this type of pneumonia is often polyfactorial. It develops accordingly in the morphological table encountered. The Katarrhal bronchopneumonia draws a mixed morphological picture, such as interstitiel or atypical interstitiel pneumonia.

Pneumonians can sometimes be defined according to their etiology.

This type of identification is mostly valid for allergic pneumonia due to allergic etiology.

The pneumonia consisting of parasitic agents is called verminose pneumonia.

Morphologically, more fungal infections characterized by purulent, pyogranulomatous pneumonia are mycotic pneumonia ;

These are the definitions of "pneumoconiosis" (pneumoconiosis, pneumoconiosis; conis: powder), which originates from silicate, asbestos powders and is generally chronic interstitial pneumonia.

The aim of this classification, especially in domestic animals, is to clarify the etiology of the disease based on morphological changes.

For example, interstitial pneumonies in domestic animals are mostly due to viral causes. In addition, a parasitic, allergic effect also occurs.

Pasteurella, Mycoplasma infections are more fibrinous; pyogen bacteria lead to apostematous changes characterized by purulent-catarrhal or abscesses.



Classification of Pneumonia

- I. Alveolar, broncho-alveolar pneumonia
- II. Pneumonia interstitialis
- III. Special pneumonia types (*focal or diffuse*)
- IV. Granulomatous pneumonia
- V. Pneumoconiosis
- VI. Allergic pneumonia

I. Alveolar, broncho-alveolar pneumonia

A. Bronchopneumonia catarrhalis (lobular pneumonia)

(serous, sero-mucinous, desquamative, purulent - subtypes)

B. Bronchopneumonia fibrinosa (lobar pneumonia)

II. Pneumonia interstitialis

III. Special pneumonia types (focal or diffuse)

A. Embolic-metastatic pneumonia

purulent or apostematous pneumonia

B. Aspiration pneumonia

gangrenous-necrotic and lipid pneumonia

**BRONCHOPNEUMONIA
CATARRHALIS**

- The agents may be hematogenous to the lung.

For example, in the inflammation of the umbilical cord, the causative agent omphologen spreads to the lung. However, in this case it is mostly metastatic abscess and purulent **BRONCHOPNEUMONIA**.

- Aerogen infection from the upper respiratory tract to the lungs with the infection occurs.

General Features

When primer occurs :

The agent mostly comes from the upper respiratory tract to the lungs with **aerogen transmission and spreads endobronchial!**

Therefore:

The inflammation is localized in alveoli and bronchioles in which one or more bronchiols terminate.

In macroscopic examination, these areas are **located in the lobules of one or more lobes**, and this type of pneumonia is also called **lobular pneumonie**.

The spread in tissue is discontinuous.

The surrounding lobes are normal.

General Features

- **Initially**, there is a serous exudate (inflammatory edema fluid) in bronch, bronchiol and alveoli . Alveoli have a few inflammatory cell.
- **Later** in this fluid, desquered epithelial cells with neutrophil leukocytes increase.
- This exudate is mixed with mucus from the bronchial glands. Thus, exudate mucous becomes muco-purulent exudate.
- Therefore, this type of pneumonia is called “catarrhal pneumoni.

General Features

- **The fever is more localized in the cranioventral lobes.**
- **The focus of each pneumonia belongs to a bronch, bronchiole.**
- **In one or several lobes, their sizes are distributed in the same or different foci (lobes).**

General Features

- The cross-section of the lung is in the granular landscape.
- It is dark or light red-yellowish-distorted exudate (liquid). Bronchus, there is similar exudate in bronchioles.
- There are also normal, atelectasis, emphysema fields around the pneumonia area .



Catarrhal bronchopneumonia NOT complicated by pleuritis.

(Because the endobronchial spreads !!!)



Lobular spreads

Aetiology

- **Primer agent is a bacterial infection.**
- In general, ordinary bacteria, or rather facultative pathogens, are activated with the help of predisposing factors and develop this type of pneumonia.

Aetiology

Irritative gases

Circulatory disorder

Fatigue

Cachexie

Immunity

Changes of nutrition and nursing

Age (predisposition)

Decreasing of elasticity on lung

Anesthetic drug

Lung edema

Infectious Factors

- **Streptococcus spp.**
- **Staphylococcus**
- **E.coli**
- **Bordetella bronchiseptica (especially interstitial pneumonia at canine distemper as secondary agent katılır.)**
- **P.multocida**
- **Pneumococcus sp. (calve)**
- **Salmonella (calve)**

Infectious Factors

- **Brucella sp. (calve)**
- **E.coli, Pasteurella, Corynebacterium pyogenes (pig, sheep)**
- **Corynebacterium equi**
- **Chylamidia sp. (rarely pig)**
- **Hemophilus suis, (rarely pig),**
- **Salmonella cholera suis (pig)**

Infectious Agents

**Addition of bacteria to
interstitial pneumonia with
viral etiology
develop secondary infection!**

Pathogenesis

- In general, the aetiology is caused by infection with the upper respiratory tract.
- However, the factors may come from hematogenous.
- In the inflammation of the umbilical cord, the causative agent omphalitis spreads to the lung. However, in this case, metastatic abscess (suppurative) pneumonia is involved.

Pathological Findings

- **Macroscopical findings**
- The distribution is lobular. The lesion is in several lobules of the lobes. (Especially in the cranio-ventral lobe)
- The consistency of these regions increased. When the organ parts are thrown into the water, they collapse to the bottom of the water. However, if it is not fully formed (initially) or in the vicinity of emphysema, it does not sink into water!

Pathological Findings

- * The color of the pneumonia regions is different in color. (Hyperemia is).
- However, the color change can sometimes change according to the type of animal and the agent !!
For example;
- - Red-brown in cattle,
- - Drool-yellowish in our mouth,
- - The dog is brownish-red in chocolate color.
- -Salmonella infection in coffee-red,
- -Streptococcus infection becomes yellowish.

Pathological Findings

- It is yellow-brown if it starts from irinified or starting from the beginning. Its consistency is increased, but it is soft compared to the previous one.
- If necrosis occurs, it becomes defective and brittle.
- If the bronchi are obstructed by exudate (obliteration), the atelectasic-emphysema regions are also found in the vicinity of the pneumonia areas.

- There is inflammatory edema in the interstitium (interlobular, interlobar regions). (edema, neutrophil infiltration and hyperemia of the vessels) therefore seen as interstitium gelatinous-edematous. Slightly enlarged.
- However, this also varies according to animal species. For example, it is not apparent in dogs.
- Cut section; It is moist. When pressed with finger, bronchial, bronchiol lumens of various colors, foam-free, fuzzy, thick exudate comes.
- Regional lymph nodes; bulging, red color (hyperemic) and moist section. Lymphoid follicles may be prominent (hyperplastic).

Histopathological Findings

- **Vessels, alveolar capillaries are hyperemic in varying degrees.**
- **Alveolar bronchial lumens have inflammatory edema fluid (protein-rich, HxE stained epithelium, neutrophil, sometimes small amount of fibrin).**

HISTOPATHOLOGICALLY : 3 Types

- I. Desquamative catarrhal bronchopneumonia
- II. Purulent catarrhal bronchopneumoni
- III. Serous, sero-mucous catarrhal bronchopneumoni

The end of Catarrhale pneumonia

- **Upon recovery, the exudate is excreted with bronchi or resorbed with vessels. The damaged alveolar and bronchial bronchiol epithelium are regenerated.**

The end of Catarrhale pneumonia

- **Chronic catarrhal pneumonia is formed.**
- **In the vicinity of bronchi and bronchiol, the connective tissue increases, peribronchitis and peribronchiolitis, or peribronchitis or peribronchiolitis nodosa result in occlusion.**
- **Since bronchial secretion increases, mucous exudate is observed in the bronch lumen.**
- **These regions are marked as the center of the lung cross section (cavity), pinhead size or larger foci, NODOSA.**
- **In interstitial tissue, the connective tissue then increases the collagen fibers. Due to fibrosis, indurative pneumonia occurs in the lung.**

The end of Catarrhale pneumonia

- It is severe and spread over large areas;
- As large bronches become clogged, asphyxia becomes a fatal death.
- Hypoxia, anoxia develops in these areas of the lungs if they are not severe and smaller bronchiols become obstructed and these areas undergo necrosis (necrotic pneumonia).

The end of Catarrhale pneumonia

- **If the area of the necrosis is not wide, it will heal with relief (first, the granulation tissue is shaped, since the region takes the consistency of the meat, carnification is mentioned.**
- **In this case and in chronic events; fibrosis, blood circulation is prevented in the lungs due to scarring, the right heart is also affected. The cor pulmonale is shaped.**

PNEUMONIA FIBRINOSA LOBER PNEUMONIA

(Bronchopneumonia fibrinosa,

Fibrinli bronchopneumoni

Pneumonia croupousa

Pneumonia craupöse

Pneumonia krupoza

Krupöz pneumoni)

General Features

- Exudate is rich in fibrin.
- The spread is different.
- Peribronchial spread shows lobar distribution; one, a few or all of the lobes.
- It is almost always complicated by pleuritis.

◆ **There are stages.**

◆ **These stages do not follow each other in the same areas are seen side by side!**

◆ **For this reason, lungs are mottled, mosaic.**

Aetiology

**Mycoplasma sp., Pasteurella sp.
(P. multocida) Hemophilus sp.
are specific agents**

For example:

- Pleurapneumonia contagiosa bovim
Pleurapneumonia contagiosa capri,
- Pleurapneumonia contagiosa equorum

Pathogenezis

4 stage

- **Inflammatory hyperemia (Stadium incrementi)**
- **Red hepatization**
- **Grey hepatization**
- **Lysis**

- Regional lymph nodes are bulging,
 - hyperemia,
 - The section is moisty.
- Lymph follicles are prominent.
 - Can be bleeding

IV. LYSIS

- **Similar to Inflammatoric Hyperemia**
Darkish color
- **Softy**
- **Cut section have greyish color fluid**
Very marked human !

At the end of:

**Trombosis very marked and no seen melting
Necrosis (necrotic-fibrinous pneumoni)**

Organisation (if the necrose small)

**Sequesterisation / pneumonia apostematosa /
gangrenosa (if the necrose enlarge)**

Sclerosis (increaseing collagen)

/ Induration

Fibrinous PLEURITIS !!!!!!!!!!!!!!!!

**INTERSTITIAL
PNEUMONIA
(Prolifere
pneumonia)**

- **Inflammation :**

- interalveolar,**
 - interlobular,**
 - peribronchial,**
 - perivascular**

Etiology

- **!!Virus, allergen and ve parasites!!**
Alimentary toxins, toxic gases, uremia
- Hypersensitivity
- Rarely **mycoplazma sp, chlamydia** sp.
- **Generally seen together with other pneumonia** (Distemper- Bordotella bronchoseptica- catarrhale bronchopneumoni)

Acute or chronic

At the end of:

- **Recovery**
- **If the complicated secondary infections :**
 - **Catarrhal bronchopneumoni**
 - **Fibrinous / Necrotic pneumoni**
- **Bronchitis, bronchiolitis**

**Bronchopneumonia
purulenta
et
apostematosa**

- This type of pneumonia is an inflammation of neutrophil leukocytes. Diffuse or focal spread of these cells in the lung; They are characterized by the dissolution of the region (by necrosis) with the help of proteolytic enzymes released from them.
- Neutrophil leukocyte infiltration and melting (necrosis) are generally not common, but focals.
- For this reason, inflammation is common purulent, more than pneumonia, ie, pneumonia apostomatosa.

Pathogenesis

It occurs mainly in 3 ways.

- ◆ **It is shaped as a result of catarrhal-purulent bronchopneumonia or fibrinous pneumonia. In this case, there are other findings about pneumonia in which the abscess is formed.**
- ◆ **It can be shaped due to trauma.**
- ◆ **The most important of them is purulent embolic-metastatic pneumonia (embolic-metastatic pneumonia apostematosa). The factors are hematogenous.**

Embolic-Metastatic Purulent Pneumonia

- ◆ It occurs in septic emboli of the fusions occurring in other parts of the body, Purulent **endocarditis, peritonitis; mastitis, endometritis (pyometra) and omphalophlebitis** etc

◆ Causative Agents:

Streptococcus spp., Staphylococcus spp., Actinomyces pyogenes, Corynebacterium spp., E. coli
etc **pyogen agents** or *Fusobacterium necrophorum*
Salmonella sp.,
Shigella (Actinobacillus) equi

- Lesions are common in purulent pneumonia, small or large abscesses sprinkled on the lungs are seen in the pneumonia apostematosa .
- In the form of purulent pneumonia, it is seen that the lobes are scattered in various lobes or covered in a whole lobe.
- These areas are observed grayish-yellowish, hard or crispy (crumbled between the fingers).
- Pus from the cross section. Small abscesses can also be selected on the surface and section of the organ.
- The bronchi and bronchiols are filled with yellowish, thick, pale exudate.

Microscopical Findings :

Alveolar, bronchi lumen, interalveolar, interlobular areas with multiple neutrophil leukocytes and coagulation necrosis are encountered.

There is a demarcation line that is consisting of neutrophil leukocytosis around the necrosis.

Apostematous Pneumonia :

Small abscesses in focal and large encapsulated neutrophils.

ASPIRATION PNEUMONIA

- **Two types :**

- 1. Gangrenous pneumonia**

- 2. Lipid pneumonia**

Pneumonia Gangrenosa

Pathogenesis

◆ It occurs by three ways.

1. Traumatic

2. Metastatic

3. Most important **ASPIRATION**
pneumonia

Aspiration pneumonia in the form of gangrenous pneumonia

Improper swallowing develops as a result of improper ingestion of foreign substances into the lung.

Necrosis occurs with the effect of these (for example with its irritating effect).

Subsequently saprophyte microorganisms join into the event, and gangrene is formed.

Gangrenous Pneumonia- Causes-

- Larynx paralysis
- Incorrect drug administration
- RPT, WMD
- Esophagus obstruction
- Trachetomie, larynx operation and perforation
- Aspirated stomach content

Macroscopical Findings :

The lesions are mostly in the cranioventral lung regions.

Purulent-abscess necrotic bronchopneumonia

In addition, purulent ulcerative bronchitis is also occurred.

Pneumonia gangrenosa:

Lung-- greenish-dark red in color, smelly;

- ◆ **Firstly; hard, then it is softened and melt in the consistency of the lesion is encountered.**
- ◆ **They can cover an entire lobe.**

Severe:

- ◆ **Caverns are formed, these are opened to the chest cavity and empyema is shaped.**
- ◆ **In cattle, these foci are often demarcated.**

2. Lipid Pneumonia

- ◆ It is another form of aspiration pneumonia.
- ◆ It is formed by aspiration of oily substances (olive oil, fish oil, paraffin liquid).
- ◆ Does not develop in the form of gangrenous pneumonia! Fibrin-leucocytes leads to exudation. Yellowish nodes (areas) are encountered.
- ◆ Microscopical Findings: The aspirated fat, fibrin, leucocyte infiltration, advanced histiocytes with phagocytosed lipids and giant cells