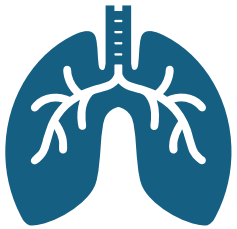
PURULENT AND APOSTEMATOUS PNEUMONIA & ASPIRATION PNEUMONIA



Purulent and Apostematous (Abscess-Forming) Pneumonias

- These pneumonias are characterized by **inflammation dominated by neutrophilic leukocytes**.
  The neutrophils infiltrate the lungs **diffusely or focally**, and by releasing **proteolytic enzymes**, they cause **necrosis** and **liquefaction (suppuration)** of the affected tissue.
- Neutrophilic infiltration and tissue necrosis are usually **localized**, not generalized; therefore, the inflammation is typically **purulent** or forms **abscesses**, which is referred to as **pneumonia apostematosa**.

Pathogenesis

- Purulent and apostematous pneumonias develop mainly in **three ways:**
- **As a sequel of other pneumonias –**
  They often arise as a complication of **catarrhal-purulent bronchopneumonia** or **fibrinous pneumonia**.
  Abscess formation occurs within previously inflamed areas of the lung.
- **Following trauma –**
  Direct injury to the lung can initiate purulent inflammation.
- **As embolic-metastatic pneumonia –**
  The **most important form**, caused by **hematogenous spread** of septic emboli originating from purulent foci elsewhere in the body.

Embolic-Metastatic Purulent Pneumonia

- This form develops when **septic emboli** lodge in the pulmonary circulation, spreading infection from primary suppurative lesions such as:
- **Purulent endocarditis**
- **Peritonitis**
- **Panaritium (hoof infections)**
- **Mastitis**
- **Endometritis (pyometra)**
- **Omphalophlebitis**
- **Causative agents** include:
  Streptococcus spp., *Staphylococcus spp.*, *Actinomyces (Corynebacterium) pyogenes*, *Corynebacterium spp.*, *E. coli*, *Fusobacterium necrophorum*, *Salmonella spp.*, *Shigella (Actinobacillus) equi*, and other **pyogenic bacteria**.

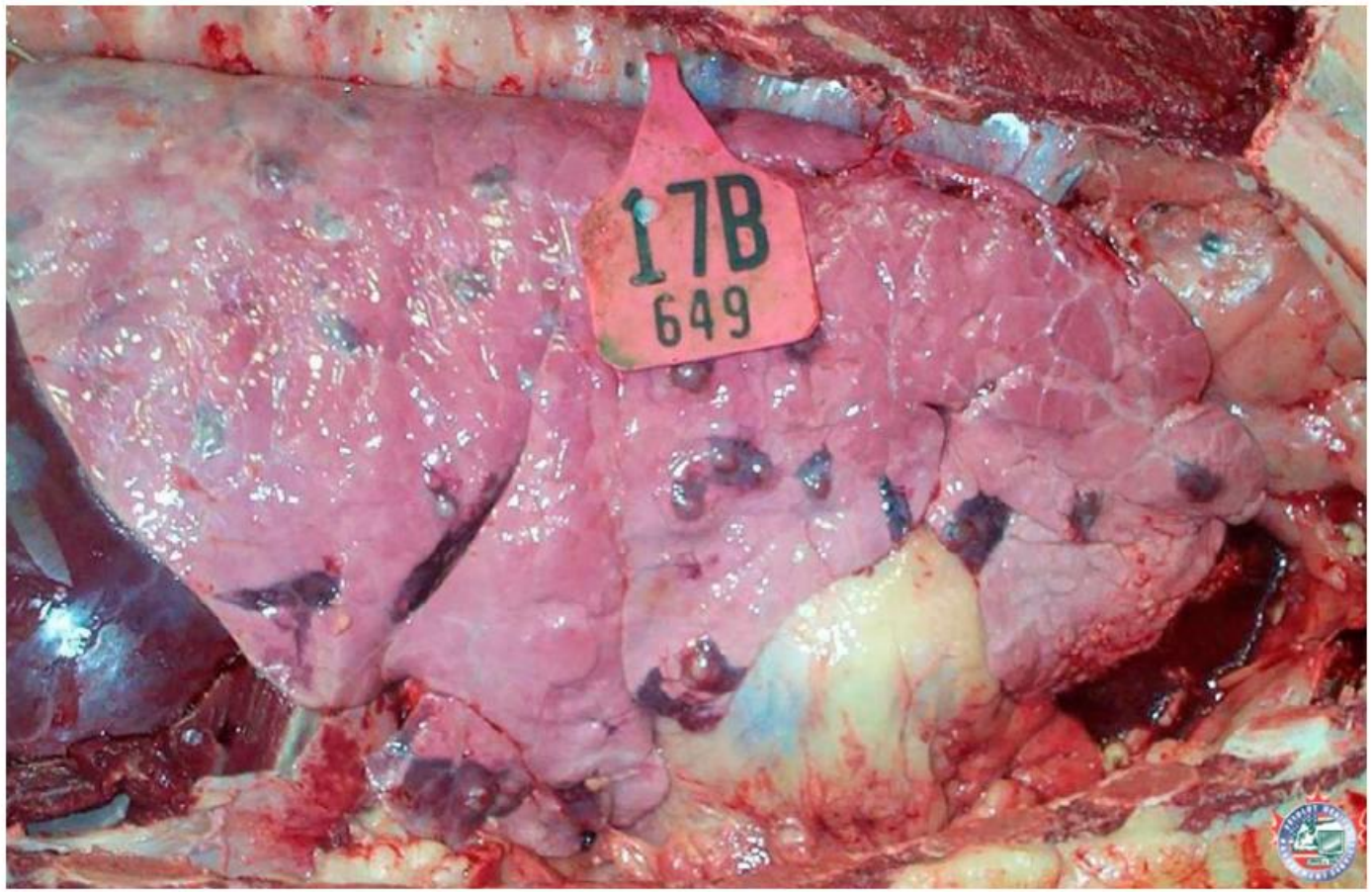


Figure: Embolic pneumonia due to liver abscesses in a feedlot steer. Photo credit: Feedlot Health Management Services.

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- **Macroscopic Findings**
- The lungs show **multiple small abscesses** (purulent foci) or **large abscesses** scattered throughout.
- In **purulent pneumonia**, lesions may involve **individual lobules** or an **entire lobe**.
- The affected areas appear **grayish-yellow**, **firm**, or **friable** (crumbly).
- **Pus** oozes out when the lung is cut.
- Small abscesses are visible both on the **surface** and in **cross-section**.
- **Bronchi and bronchioles** are filled with **thick, yellowish exudate**.

- **Microscopic Findings**
- **Numerous neutrophilic leukocytes** fill the **alveoli**, **bronchial lumens**, **interalveolar**, and **interlobular** regions.
- **Coagulative necrosis** is common.
- Around necrotic centers, a **demarcation zone** of neutrophilic leukocytes is present.
- **Apostematous pneumonia** is defined by **small focal abscesses** or **large encapsulated purulent foci** composed of neutrophilic exudate.

ASPIRATION PNEUMONIA

- Aspiration pneumonia occurs when **foreign material** is **inhaled into the lungs**, causing **inflammatory** and sometimes **necrotic** changes.
  It has two major forms:
- **Gangrenous Pneumonia**
- **Lipid Pneumonia**

Gangrenous Pneumonia

Pathogenesis

- Gangrenous pneumonia may develop in **three ways**:
- **Traumatic origin**
- **Metastatic spread**
- **Aspiration pneumonia** (the **most common cause**)
- In aspiration pneumonia, **improper swallowing** or **ingestion of foreign substances** leads to **necrosis** of lung tissue due to chemical irritation.
  When **saprophytic bacteria** invade these necrotic areas, **gangrene** develops.

Causes

- **Incorrect feeding** practices
- **Regurgitation or aspiration of feed** (RPT)
- **White muscle disease**
- **Aujeszky's disease, botulism, rabies, brain trauma**
- **Laryngeal paralysis**
- **Esophageal obstruction**
- **Aspiration of gastric contents**
- **Inhalation during tracheotomy, laryngeal surgery, or perforation**

Macroscopic Findings

- Lesions are mostly located in the **cranioventral lung lobes**.
- **Purulent-abscess and necrotic bronchopneumonia** are present, with **gangrenous changes** predominating.
- The lungs appear **greenish to dark red (dirty red)**, **malodorous**, and **friable** (initially firm, later softening and liquefying).
- Lesions may involve an **entire lobe**.
- **Cavities (caverns)** may form as the necrotic tissue liquefies and drains; in advanced cases, this may open into the **pleural cavity**, causing **empyema**.
- In cattle, gangrenous foci are often **well demarcated** from normal tissue.

Grossly, this may appear as a cranioventral area of consolidation similar to other forms of bronchopneumonia. However, the characteristic features to suggest aspiration pneumonia are a localized or unilateral lesion, which is often foul-smelling and necrotic/friable due to anaerobic bacterial infection.

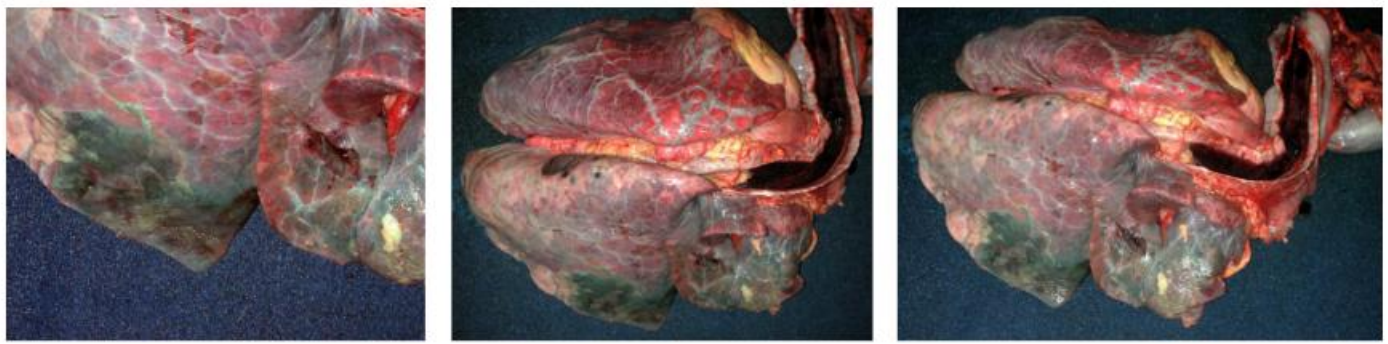

Figure: Cow, aspiration pneumonia. The lesion is unilateral (right side), localized, green, and foul-smelling. Interlobular emphysema is present, secondary to dyspnea.

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Lipid Pneumonia

- This form of aspiration pneumonia develops following the **inhalation of oily substances**, such as:
- **Olive oil**
- **Fish oil**
- **Liquid paraffin**
- Unlike gangrenous pneumonia, **lipid pneumonia** does **not** involve gangrene. Instead, it leads to **fibrinous and leukocytic exudation** and the appearance of **yellowish nodules** in the lung tissue.
- **Microscopic Findings**
- **Aspirated fat** droplets are visible within **macrophages**.
- There is **fibrin and leukocyte infiltration**,
- Presence of **histiocytes** containing **phagocytosed lipids**, and
- **Multinucleated giant cells** surrounding lipid-laden areas.