



Review Article

Pneumonia And Types & An Over View On Aspiration Pneumonia

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ABSTRACT

Pneumonia is an inflammatory condition of lungs espacillay affecting the alveoli, and the parenchyma of the lung. Whereas aspiration pneumonia is a significant health care concern characterized by inflammation of lung parenchyma due to inhalation of foreign materials, including gastric contents and oropharyngeal secretions. This article provides a comprehensive over view of etiology, pathogenesis, diagnosis, and management strategies for aspiration pneumonia. The pathogenesis of aspiration pneumonia is complex, involving both chemical and bacterial components. Radio graphic imaging, such as chest X-rays and computed tomography scans, aids in identifying consolidations or infiltrates in the lung parenchyma. Antibiotic therapy should be tailored based on the causative microorganisms and local resistance patterns. This review also explores the therapeutic advancements that holds promise for enhancing the management of aspiration pneumonia.

INTRODUCTION

Pneumonia is a common and potentially serious respiratory infection that affects the lungs. It can be caused by various microorganisms, including bacteria, viruses, fungi, and even certain chemicals, resulting in inflammation and swelling of the air sacs in one or both lungs. inflammation can lead to a range of symptoms and complications, ranging from mild to severe .Pneumonia can be caused by different types of microorganisms. The most common causes are:

Bacteria:

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Streptococcus pneumoniae (pneumococcus) is the most common bacterial cause of pneumonia, but other bacteria like Haemophilus influenzae, Staphylococcus aureus, and Legionella pneumophila can also lead to pneumonia.

Viruses:

Influenza viruses, respiratory syncytial virus (RSV), and coronaviruses are examples of viral agents that can cause viral pneumonia.

Fungi:

Fungal pneumonia is relatively rare and typically affects people with weakened immune systems.



Examples include *Pneumocystis jirovecii* (common in HIV/AIDS patients) and *Aspergillus* species.

Mycoplasma pneumonia :

This type has somewhat different symptoms and physical signs and is referred to as atypical pneumonia. It is caused by the bacterium *Mycoplasma pneumoniae*. It generally causes a mild, widespread pneumonia that affects all age group

Other Agents:

Sometimes, pneumonia can also be caused by inhaling certain chemicals, aspirating (inhaling) food, fluids, or other foreign objects into the lungs, or by a combination of factors.

Types of Pneumonia :

Pneumonia can be classified into several types based on different criteria, including the causative agent, the location of infection, and the setting in which it was acquired. Here are the main types of pneumonia:

1. Community-Acquired Pneumonia (CAP):

This type of pneumonia is acquired outside of healthcare settings and is one of the most common forms. It can be caused by various bacteria, viruses, and occasionally fungi. *Streptococcus pneumoniae* is the most common bacterial cause of CAP. Viral causes include influenza and respiratory syncytial virus (RSV).

Symptoms :

- Cough
- Fever Chest pain
- Shortness of Breath
- Fatigue: Generalized tiredness and weakness.
- Confusion (in the elderly)
- Chest pain

Antibiotics:

Oral amoxicillin plus a macrolide [eg: azithromycin or clarithromycin]

Antiviral Medications: Acyclovir, Ganciclovir.

Supportive Care:

Rest, hydration, and over-the-counter medications to reduce fever and discomfort can help manage symptoms.

Vaccinations: PCV13, PPV23.

Good Hygiene: Practicing proper hand hygiene and avoiding close contact with sick individuals can help prevent the spread of infectious agents.

Risk Factors:

1. Age:
Elderly: Adults aged 65 and older are more vulnerable to CAP due to weakened immune function and age-related changes in lung structure.
2. Weakened Immune System
3. Swallowing Problems
4. Alcohol and Substance Abuse
5. Exposure to Airborne Irritants
6. Viral Infection



Fig no 1: Community – Acquired pneumonia

2. Hospital-Acquired Pneumonia (HAP):

HAP, also known as nosocomial pneumonia, occurs 48 hours or more after admission to a hospital. It is often more serious than CAP and tends to affect individuals who are already ill or have weakened immune systems. The causative agents can include drug-resistant bacteria like Methicillin-resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa*.

Symptoms :

A cough with greenish or pus-like sputum

- Fever and chills

- Sharp chest pain that gets worse with deep breathing or coughing
- Shortness of breath
- Decreased blood pressure and fast heart rate

Treatments

Antibiotics:

piperacillin-tazobactam, cefepime

Oxygen Therapy:

Patients with low blood oxygen levels may receive supplemental oxygen to improve oxygen saturation. Oxygen to help you breathe better and lung treatments to loosen and remove thick mucus from your lungs.

Fluids and Nutrition:

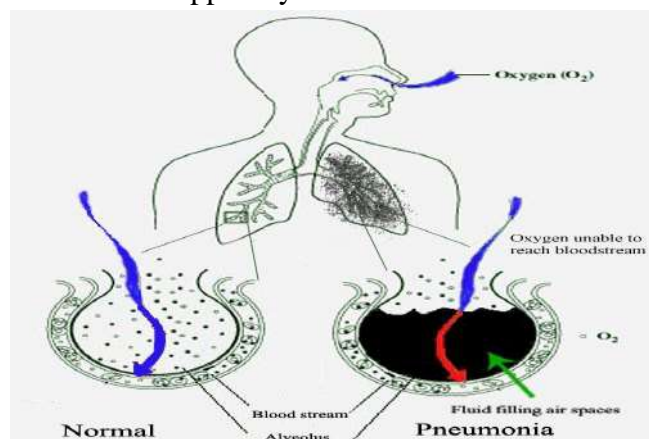
Adequate hydration and nutrition are important for recovery. If necessary, intravenous fluids or tube feeding may be used.

Risk factors:

1. Hospitalization of long time:
2. Age:
3. Underlying Health Conditions:

Chronic illnesses like diabetes, chronic obstructive pulmonary disease (COPD), heart disease, and kidney disease can weaken the immune system, making patients more susceptible to infections.

4. Immune support system



3. Viral Pneumonia:

Viral pneumonia is an infection of lungs caused by a virus. The most common cause is the viral flu, but you can also get viral pneumonia from the common cold and other viruses. These nasty germs

usually stick to the upper part respiratory system. But the trouble starts when they get down into your lungs.

Symptoms

Cough:

A persistent cough that may produce mucus or phlegm.

Shortness of Breath:

Difficulty breathing or feeling breathless, especially during physical activity or exertion.

Rapid Breathing:

Increased respiratory rate, also known as tachypnoea.

Chest Pain:

Sharp or dull chest pain, particularly when breathing deeply or coughing.

Sore Throat:

Irritation or discomfort in the throat.

Nasal Congestion:

Stuffy or runny nose, which is more common with some viral infections.

Treatments

1. Antiviral Medications:

Ribavirin, Rimantadine, Acyclovir

2. Supplemental Oxygen:

supplemental oxygen may be administered to ensure proper oxygenation of the body's tissues.

3. Hospitalization:

If the symptoms are severe or if the patient is at risk of complications (e.g., elderly individuals, those with underlying health conditions), hospitalization might be necessary. In the hospital, medical professionals can provide closer monitoring, oxygen therapy, and other interventions as needed.

4. Respiratory Support:

In cases of significant respiratory distress, mechanical ventilation or other respiratory support measures may be required to assist with breathing.

Risk Factors

1. Age
2. Weakened Immune System

3. Smoking
4. Viral Exposure
5. Lack of Vaccination

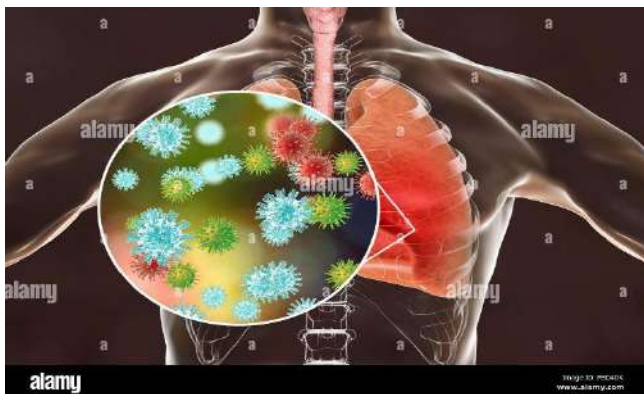


Fig no 3: viral pneumonia, conceptual illustration.

4. Fungal Pneumonia:

Fungal pneumonia is a non-contagious lung infection caused by fungal spores. It happens when the spores mix with the air and are inhaled, or when an inactive infection is reactivated. Fungal pneumonia symptoms are those of the flu: coughing, headache, thick mucus, fever, and chest pain. Fungal pneumonia is relatively uncommon and typically affects individuals with weakened immune systems, such as those with HIV/AIDS, organ transplant recipients, or individuals undergoing chemotherapy. Pneumocystis jirovecii pneumonia (PCP) is a notable example of fungal pneumonia, often seen in people with suppressed immune systems.

Symptoms

- Chills
- Cough with thick, coloured phlegm
- Shortness of breath
- Pain while breathing or coughing
- Nausea and/or vomiting
- Diarrhoea

Treatments

1. Fluconazole
2. Amphotericin B injection
3. Trimethoprim/sulfamethoxazole
4. Oxygen Therapy
5. Antifungal Medications

6. Surgery

Risk Factors

- HIV/AIDS
- Cancer, especially hematologic malignancies and solid tumours
- Organ transplantation and use of immunosuppressive drugs
- Long-term corticosteroid use
- Autoimmune disorders, such as lupus or rheumatoid arthritis
- Chronic diseases like diabetes

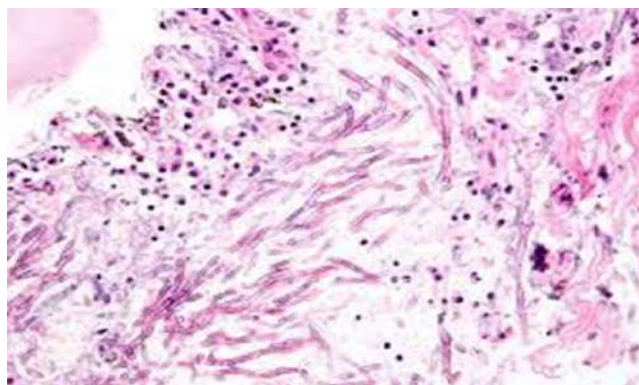


Fig No 4: Fungal Pneumonia

5. Opportunistic pneumonia:

Opportunistic pneumonia refers to a type of lung infection caused by opportunistic pathogens, which are microorganisms that usually do not cause disease in healthy individuals with intact immune systems. However, when a person's immune system is compromised or weakened, these pathogens can take advantage of the opportunity and cause infections.

Symptoms :

- Shortness of Breath
- Chest Pain
- Fatigue
- Weakness
- Sputum Production

Treatments

1. Antimicrobial Therapy:

This is the primary treatment for opportunistic pneumonia. The choice of antimicrobial agents depends on the identified or suspected pathogen.

Antifungal, antibacterial, or antiviral medications may be prescribed based on the specific infection. azoles, echinocandins, amphotericin B may be used to treat fungal pneumonias like *Pneumocystis jirovecii* pneumonia or invasive aspergillosis.

2. Preventive Measures:

If a person has a known predisposition to opportunistic infections, taking preventive measures such as prophylactic medications or vaccinations can be recommended to reduce the risk of infection.

3. Monitoring:

Regular monitoring of the patient's response to treatment, as well as any potential side effects of medications, is crucial. Adjustments to the treatment plan may be needed based on the patient's clinical progress.

4. Isolation and Infection Control:

In healthcare settings, appropriate isolation measures may be necessary to prevent the spread of the infection to others.

5. Surgical Interventions:

In some cases, particularly with fungal infections that cause abscesses or other complications, surgical intervention may be required to remove infected tissue or drain abscesses.

Risk Factors

1. HIV/AIDS
2. Organ Transplantation
3. Cancer and Chemotherapy
4. Immunosuppressive Medications
5. Age
6. Environmental Exposure

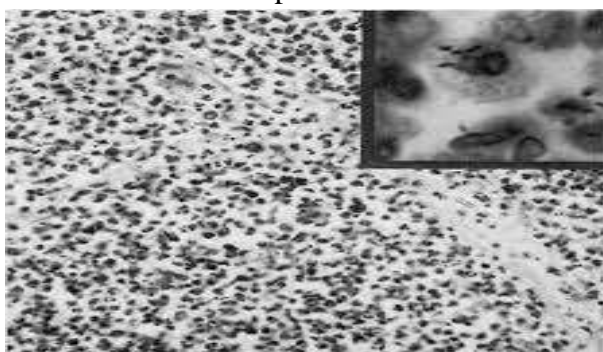


Fig no. 5. Opportunistic pneumonia

6. Bronchopneumonia:

Bronchopneumonia is a type of pneumonia that involves inflammation of multiple small areas of the lung tissue around the bronchi and bronchioles (small airways). It often results in a patchy distribution of inflammation. It's important to note that pneumonia classification can sometimes overlap, and the distinction between types might not always be clear-cut. Diagnosis and treatment depend on identifying the specific cause of pneumonia, the individual's health status, and other relevant factors. Bronchopneumonia, also known as lobular pneumonia or focal pneumonia,

Causes:

Bronchopneumonia can be caused by a range of microorganisms, including:

Bacteria:

Streptococcus pneumoniae, *Staphylococcus aureus*, *Haemophilus influenzae*, *Klebsiella pneumoniae*, and others.

Viruses:

Influenza virus, respiratory syncytial virus (RSV), adenovirus, and others.

Fungi:

In immunocompromised individuals, fungi like *Pneumocystis jirovecii* or *Aspergillus* spp. can cause bronchopneumonia.

Symptoms

- Symptoms of bronchopneumonia can vary in intensity and may include:
- Cough, which can produce greenish or yellowish sputum.
- Shortness of breath and increased respiratory rate.
- Fever and chills.
- Chest pain or discomfort.
- Fatigue and weakness.
- Confusion, particularly in elderly patients.

Treatments

The treatment of bronchopneumonia depends on the underlying cause and severity of the infection. It often involves:

Antibiotics:

If the cause is bacterial, appropriate antibiotics are prescribed based on the suspected or identified pathogen and its sensitivity to antibiotics. Commonly prescribed antibiotics for bronchopneumonia include:

- Macrolides (such as azithromycin or clarithromycin)
- Penicillins (such as amoxicillin or ampicillin)
- Cephalosporins (such as ceftriaxone)
- Fluoroquinolones (such as levofloxacin or moxifloxacin)

Antiviral medications:

In cases caused by viruses, antiviral drugs may be used if available and effective.

Supportive care:

Rest, hydration, and fever-reducing medications can help manage symptoms.

Chest Physiotherapy:

This technique involves techniques such as postural drainage and percussion to help loosen and clear mucus from the airways.

Oxygen therapy:

In severe cases, supplemental oxygen may be necessary to maintain adequate oxygen levels.

Risk factors

Living Conditions:

Overcrowded living conditions, such as in nursing homes or dormitories, can facilitate the spread of respiratory infections, including bronchopneumonia.

Aspiration

Cigarette Smoking

Respiratory Infections

Underlying Health Conditions:

Conditions such as heart disease, liver disease, and kidney disease can make the body more vulnerable to infections like bronchopneumonia.

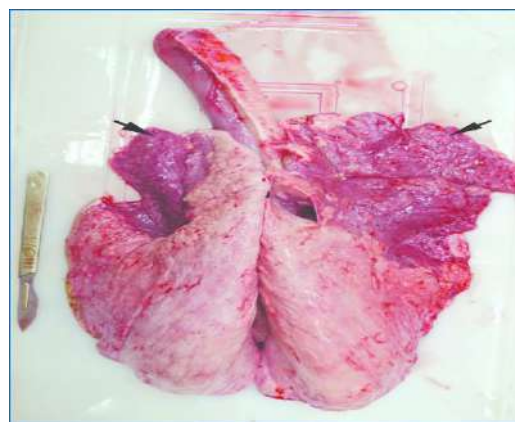


Fig no.6. Macroscopic appearance of broncho pneumonia

Aspiration Pneumonia

Aspiration pneumonia is an infection of the lungs caused by inhaling saliva, food, liquid, vomit and even small foreign objects. It can be treated with appropriate medications. If left untreated, complications can be serious, even fatal. Aspiration pneumonia is pneumonia that is caused by something other than air being inhaled (aspirated) into your respiratory tract. These non-air substances can be food, liquid, saliva, stomach contents, toxins or even a small foreign object. There's also a condition called aspiration pneumonitis which is caused by the same type of thing happening but there is only inflammation (swelling) and irritation, not infection. It's difficult to tell the two conditions apart. Other names for aspiration pneumonia include anaerobic pneumonia, necrotizing pneumonia and aspiration of vomitus. Aspiration of food or drink is a relatively common thing. You've probably heard someone say that food "went down the wrong pipe," meaning that food or drink went toward your lungs instead of your stomach. When this happens, you probably coughed until you felt better. When the same sort of thing happens to someone who isn't able to cough the food or drink out of their lungs, aspiration pneumonia may result.

INTRODUCTION

The population in many countries is ageing, with the fastest growing cohort being very old (>80 years of age), who are projected to make up 12.3% of the world's population by 2029. The ideal situation is for people to age well with minimal disability, maintaining functioning independence for as long as possible. However, for many, increasing age associated with increasing dependency and vulnerability. Geriatric syndromes (or giants) are medical problems that frequently present in older adults. They all have multiple aetiological factors and ultimately lead to physical decline and death. In recent years frailty and dysphagia have been included amongst these geriatric syndromes. Pneumonia is a common reason for older people to be admitted to hospital, and the literature suggests that those who are the frailest are more likely to be diagnosed with Aspiration Pneumonia (AP). This paper has been written not to discuss frailty or sarcopenia, per se, but more so to discuss the interpretation of pneumonia in the context of frailty. We discuss the relationship between pneumonia and frailty and suggest that there should be a change of nomenclature and, rather than trying to differentiate pneumonia "types", pneumonia in older frail adults should be called Frailty-associated Pneumonia (FAP).

Nosocomial pneumonia can be classified into various subtypes, the most common of which is aspiration pneumonia (Marik, 2011). Aspiration is defined as the misdirection of oropharyngeal or gastric contents into the larynx and lower respiratory tract. Aspiration pneumonia then results when orogastric secretions colonized with bacteria produce an infectious response in the lungs. Aspiration of sterile contents causes chemical inflammation or aspiration pneumonitis (Marik, 2011).

There are three causes for aspirations that lead to aspiration pneumonia:

1. Orogastric secretions in patients with marked disturbance of consciousness. For example, acute neurological insult including stroke or head trauma.
2. Misdirected orally ingested liquids and/or foods due to swallowing difficulties secondary to a medical condition or intervention. For example, progressive neurological illnesses including Parkinson's disease, ALS as well as tumours of the head and neck or iatrogenic causes such as head and neck cancer treatments such as surgical ablation, chemoradiation therapy and damage to the laryngeal area following prolonged endotracheal intubation.
3. Misdirected orally ingested liquids and/or foods due to aging process.

Pneumonitis is best defined as acute lung injury following the aspiration of regurgitated gastric contents. This syndrome occurs in patients with a marked disturbance of consciousness, such as drug overdose, seizures, and anesthesia. Drug overdose is a common cause of aspiration pneumonitis, occurring in approximately 10 per cent of patients hospitalized following a drug overdose. The risk of aspiration increases with the degree of unconsciousness (as measured by the Glasgow Coma Scale). Historically, the syndrome most commonly associated with aspiration pneumonitis is Mendelson's syndrome. Aspiration pneumonia occurs when regurgitated gastric contents or oropharyngeal secretions or food are inadvertently directed into the trachea and subsequently into the lungs. As the bacteria and other microorganisms become part of an infiltrate within the lung tissue, the resulting effect is an infection in the lung (Pace & McCullough, 2010). Approximately half of all healthy adults aspirate small amounts of oropharyngeal secretions during sleep. However, if the mechanical, humoral, or cellular mechanisms are impaired or if the aspirated inoculum is large enough, pneumonia may follow.



Any condition that increases the volume and/or bacterial burden of oropharyngeal secretions when the host defense mechanism is impaired may lead to aspiration pneumonia (Marik, 2011). Healthy people commonly aspirate small amounts of oral secretions, but normal defense mechanisms usually clear the inoculum without sequelae. Aspiration of larger amounts, or aspiration in a patient with impaired pulmonary defenses, often causes pneumonia and/or abscess. Elderly patients tend to aspirate because of conditions associated with aging that alter the level of consciousness, sedative use, neurologic disorders, weakness and other disorders. Paediatric populations have different causes of dysphagia than in adult populations. These causes include: cerebral palsy; acquired/traumatic brain injury; other neuromuscular disorders; craniofacial malformations; airway malformations; congenital

cardiac disease; gastrointestinal disease; ingestional injuries; and preterm birth. Aspiration pneumonia represents five per cent to 15 per cent of pneumonias in the hospitalized population. It has been suggested that dysphagia carries a seven-fold increase risk of aspiration pneumonia and is an independent predictor of mortality. Critically ill patients have an increased risk for aspirating oropharyngeal secretions and regurgitated gastric contents. For those who are tube-fed, aspiration of gastric contents is of greater concern. Because no bedside tests are currently available to detect micro aspirations, efforts to prevent or minimize aspiration take on added importance. Silent aspiration is frequent in the pediatric population. Aspiration pneumonia generally occurs in elderly, debilitated patients with dysphagia. Epidemiological studies have demonstrated that the incidence of pneumonia increases

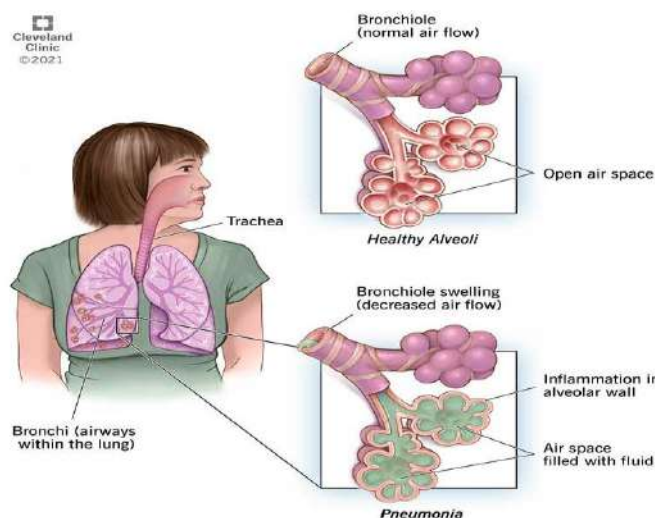


Fig no. 7. Aspiration pneumonia

Mechanism for development of Pneumonia

:Pneumonia frequently starts as an upper respiratory tract infection that moves into the lower respiratory tract. It is a type of pneumonitis (lung inflammation). The normal flora of the upper airway give protection by competing with pathogens for nutrients. In the lower airways, reflexes of glottis, actions of complement proteins and Immunoglobulins are important for protection.

Micro Aspiration of contaminated secretions can infect the lower airways and cause pneumonia. The progress of pneumonia is determined by the virulence of the organism; the amount of organism required to start an infection; and the body's immune response against the infection. Pneumonia is an inflammatory condition of the lungs characterized by the infection of the alveoli (small air sacs) and the surrounding lung tissue. The

development of pneumonia involves a complex interplay of factors, including microorganisms, host immune response, and lung physiology. Here's an overview of the mechanisms involved in the development of pneumonia:

1. Pathogen Entry and Colonization:

Pneumonia often begins when pathogenic microorganisms, such as bacteria, viruses, or fungi, enter the respiratory tract. This can occur through inhalation of contaminated air, aspiration of oral or gastric contents, or spread from other parts of the body.

2. Airway Defensive Mechanisms:

The respiratory tract has several mechanisms to defend against invading pathogens:

- **Mucociliary Clearance:** The respiratory epithelium is lined with cilia that move mucus and trapped particles upward, away from the lungs.
- **Alveolar Macrophages:** These immune cells reside in the alveoli and engulf and destroy pathogens that reach the lower respiratory tract.

3. Microbial Colonization and Replication:

If pathogens evade initial defences mechanisms, they can adhere to respiratory epithelial cells, multiply, and colonize the respiratory tract.

4. Inflammation and Immune Response:

- **Recognition:** Immune cells recognize pathogen-associated molecular patterns (PAMPs) on the invading microorganisms.
- **Activation:** Immune cells release inflammatory cytokines, signalling molecules that trigger an immune response.
- **Recruitment:** Inflammatory cytokines attract neutrophils, monocytes, and other immune cells to the site of infection.
- **Phagocytosis:**

Immune cells engulf and destroy invading pathogens through phagocytosis.

- **Inflammatory Damage:**

Inflammation can cause damage to lung tissue, leading to leakage of fluid and cells into the alveoli, which impairs gas exchange.

5. Alveolar Consolidation:

As the immune response continues, immune cells, debris, and fluid accumulate in the alveoli, leading to consolidation—the replacement of air with inflammatory material. This compromises the lungs' ability to oxygenate blood.

6. Impaired Gas Exchange:

The accumulation of inflammatory material in the alveoli reduces the surface area available for gas exchange, leading to hypoxia (low oxygen levels) and impaired removal of carbon dioxide.

Pillars of Pneumonia from Aspiration

Aspiration pneumonia is a type of pneumonia that occurs when foreign materials, such as food, liquids, or gastric contents, are inhaled into the lungs. Aspiration can lead to inflammation and infection in the lung tissue. There are three main pillars in understanding aspiration pneumonia:

1. Aspiration Event:

Aspiration pneumonia begins with the actual aspiration event, where foreign materials enter the lower respiratory tract instead of being swallowed into the digestive system. Aspiration can occur when there is a dysfunction in the swallowing process (dysphagia) or when the protective reflexes that prevent aspiration are compromised. This can happen during episodes of reduced consciousness (e.g., anaesthesia, sedation, seizures), impaired gag reflex, or while vomiting.

2. Inflammatory Response:

Once the aspirated material enters the lungs, it triggers an inflammatory response. This immune response is a natural defences mechanism intended to eliminate the foreign material and any potential pathogens. However, in cases of aspiration, the immune response can lead to inflammation of the

lung tissue and alveoli. The aspirated material, which may contain bacteria or irritants, can contribute to infection and further lung damage. Common risk factors for aspiration pneumonia include:

- Dysphagia (difficulty swallowing) due to neurological disorders, stroke, or certain medical conditions.
- Reduced consciousness, such as during anaesthesia, sedation, or alcohol/drug intoxication.
- Neurological disorders affecting the gag reflex or the ability to control swallowing.
- Gastroesophageal reflux disease (GERD) that allows stomach contents to flow back into the oesophagus and potentially the airways.
- Advanced age, as weakened muscles and impaired reflexes can increase the risk of aspiration.

3. Infection and Aspirational Pneumonia:

The combination of inflammation and potential infection can lead to the development of pneumonia. The aspirated material can contain microorganisms, including bacteria, that thrive in the lungs and cause an infection. The lung's natural defences mechanisms, such as cilia and immune cells, may become overwhelmed by the large volume of aspirated material or by the presence of harmful microorganisms.

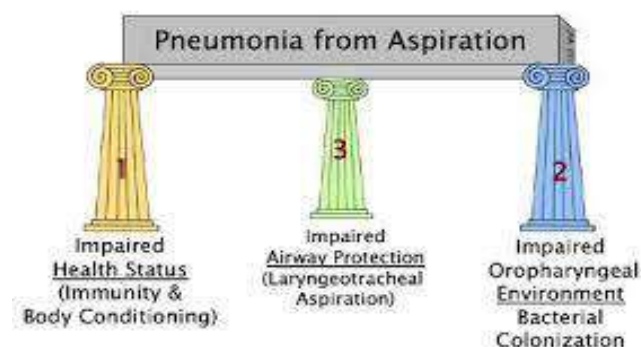


Fig.no. 8 Three pillars of pneumonia from aspiration

Etiology of aspiration pneumonia

While identifying an etiologic agent for pneumonia is essential for effective treatment as well as epidemiological record keeping, this is seldom seen in clinical practice. Widespread reviews have shown that a single cause of pneumonia has often been identified in less than 10% of patients presenting to the emergency department.[6] Nonetheless, the most common organisms causing pneumonia can be studied under the headings mentioned earlier.

Aspiration pneumonia occurs when foreign materials, such as food, liquids, or gastric contents, are inhaled into the lungs, leading to inflammation and infection. The development of aspiration pneumonia can be caused by various factors that impair the protective mechanisms of the upper airway and increase the risk of aspiration. Here are some common etiological factors:

1. Dysphagia:

Difficulty swallowing, known as dysphagia, is a major risk factor for aspiration pneumonia. It can be caused by neurological disorders that affect the muscles involved in swallowing or the coordination of swallowing reflexes. Conditions like stroke, Parkinson's disease, ALS (amyotrophic lateral sclerosis), and certain types of muscular dystrophy can lead to dysphagia.

2. Impaired Consciousness:

Episodes of reduced consciousness, such as anesthesia, sedation, seizures, or intoxication, can weaken protective reflexes and increase the risk of inhaling foreign materials into the lungs.

3. Neurological Disorders:

Conditions that affect the central nervous system or peripheral nerves can lead to impaired control of the muscles involved in swallowing and coughing. Neurological disorders like multiple sclerosis, myasthenia gravis, and Guillain-Barré syndrome can increase the risk of aspiration.

4. Gastroesophageal Reflux Disease (GERD):

GERD is a condition where stomach contents flow back into the esophagus. In severe cases, stomach

contents can reach the upper airway, increasing the risk of aspiration.

5. Esophageal Disorders:

Certain conditions that affect the esophagus, such as achalasia (a disorder of the esophageal muscles) or strictures, can lead to food and liquids being retained in the esophagus and potentially aspirated into the lungs.

6. Structural Abnormalities:

Abnormalities of the anatomy of the mouth, throat, or airway can disrupt the normal passage of food and liquids during swallowing, increasing the likelihood of aspiration.

7. Impaired Gag Reflex:

Conditions or medications that weaken or impair the gag reflex can make it difficult for the body to expel foreign materials from the airway.

8. Poor Oral Hygiene:

Dental problems or poor oral hygiene can increase the risk of aspiration by allowing bacteria to thrive in the oral cavity, potentially leading to respiratory infections.

9. Advanced Age:

As people age, weakened muscles, decreased sensation, and impaired reflexes can increase the risk of aspiration.

10. Intubation and Ventilation:

Patients who require intubation and mechanical ventilation are at increased risk of aspiration due to the presence of an artificial airway and the suppression of protective reflexes.

11. Malnutrition and Dehydration:

Weakened muscles and impaired reflexes resulting from malnutrition and dehydration can increase the risk of aspiration.

Epidemiology of Aspirational Pneumonia

The incidence of aspiration pneumonia in CAP and HAP was 60.1% (264/439 cases) and 86.7% (130/150 cases), respectively. Three hundred ninety-four patients of 589 patients hospitalized for pneumonia (66.8%) were diagnosed with aspiration pneumonia.

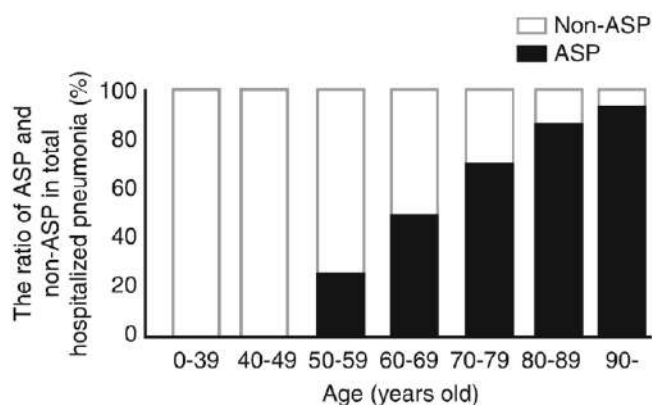


Fig.no. 9. The ratio of aspiration pneumonia (ASP) and any type of pneumonia except aspiration pneumonia (non-ASP) in total hospitalized pneumonia according to age.

The incidence of aspiration pneumonia in CAP and HAP was 60.1% (264/439 cases) and 86.7% (130/150 cases), respectively. Three hundred ninety-four patients of 589 patients hospitalized for pneumonia (66.8%) were diagnosed with aspiration pneumonia. A swallowing function testing was performed on 361 patients (61.2%) in the current study. The water swallowing test was most frequently performed. Three hundred forty-four of 589 patients (58.4%) were examined using the water swallowing test. The repetitive saliva swallowing test and the simple-swallowing provocation test were used for approximately 20% of the patients. Only 6.2% of the patients with pneumonia were examined using video fluography. This study revealed that aspiration pneumonia was common in CAP and HAP in hospitalized patients. Although the hospitalized patients were older, the incidence of aspiration pneumonia is high, which had not been previously speculated.

Clinical Epidemiology

In 2010 there were approximately 190,000 inpatient admissions in the United States for which the principal diagnosis was food/vomit (or aspiration) pneumonitis (ICD-9 507.0). These hospitalizations accounted for more than 19,000 inpatient deaths with a total medical care cost of 2.7 billion dollars. Another 370,000 persons

received a secondary diagnosis of aspiration pneumonitis. Swallowing disorders due to neurologic diseases affect 300,000 to 600,000 people each year in the United States. Nearly 40% of stroke patients with dysphagia aspirate and develop pneumonia. Overall, aspiration pneumonitis accounts for approximately 0.5% of all hospitalizations, 3% to 4% of inpatient mortality, and 5% to 23% of all cases of community-acquired pneumonia. More than 70% of cases of aspiration pneumonia are in persons older than 65 years of age. As a corollary, aspiration pneumonia is the second most frequent principal cause of hospitalizations among United States Medicare patients. 4 Among nursing home patients, aspiration pneumonia accounts for up to 30% of cases of pneumonia, occurs at a rate three times that of age-matched patients in the community and markedly increases the risk of death. Among such patients, difficulty swallowing food, use of tube feedings, requiring assistance with feeding, delirium, and use of sedative medications are the most frequent risk factors for aspiration pneumonia. While the debilitated elderly are at particularly high risk, prior silent aspiration is also common in apparently healthy elderly patients with community-acquired pneumonia. Aspiration complicates the course of approximately 10% of persons admitted to hospitals for overdosage with sedative or hypnotic agents and 0.05% to 0.8% of persons receiving general anesthesia for surgical procedures. Patient characteristics independently associated with an increased risk of aspiration following general anesthesia include male sex, non white race, age of \square 60 years, dementia, chronic obstructive pulmonary disease, renal disease, malignancy, moderate to severe liver disease, and emergency surgery.

AP associated with stroke and chronic neurological conditions:

Estimates vary according to clinical conditions, but 10-50% of patients with stroke will develop AP (30-33), also known as stroke-associated pneumonia (SAP). Approximately 11% of patients hospitalised with Parkinson's disease or dementia develop AP over a 3-month period (34), and dementia with Lewy bodies carries a particularly high risk of AP (16). AP also commonly complicates multiple sclerosis, motor neurone disease, Huntington's disease, Down syndrome and cerebral palsy.

Prevalence:

Aspiration pneumonia is more common in certain populations, including the elderly and individuals with certain medical conditions. It is a significant concern among people with dysphagia (difficulty swallowing), neurological disorders (such as stroke, Parkinson's disease, or dementia), and those with compromised airway protection due to conditions like gastroesophageal reflux disease (GERD).

Age:

The risk of aspiration pneumonia increases with age. Elderly individuals often have weakened swallowing reflexes, decreased cough strength, and other factors that can contribute to aspiration. Hospital-Acquired vs. Community-Acquired: Aspiration pneumonia can be classified into two main types based on where the aspiration event occurs: hospital-acquired and community-acquired. Hospital-acquired aspiration pneumonia tends to occur in individuals who are already hospitalized and may have additional risk factors due to their medical condition and treatments.

Mortality and Morbidity:

Aspiration pneumonia can range from mild to severe, and its outcomes depend on the health status of the individual and the promptness of treatment. Severe cases can lead to respiratory failure, sepsis, and even death. Mortality rates can vary widely based on factors such as age,

underlying health conditions, and the presence of complications

Pathophysiology

The pathological process of aspiration pneumonia occurs when the normal defense mechanisms fail

in a predisposed individual. The entry of fluid into the bronchi and alveolar space triggers an anti-inflammatory reaction with the release of proinflammatory cytokines, tumor necrosis factor-alpha, and interleukins

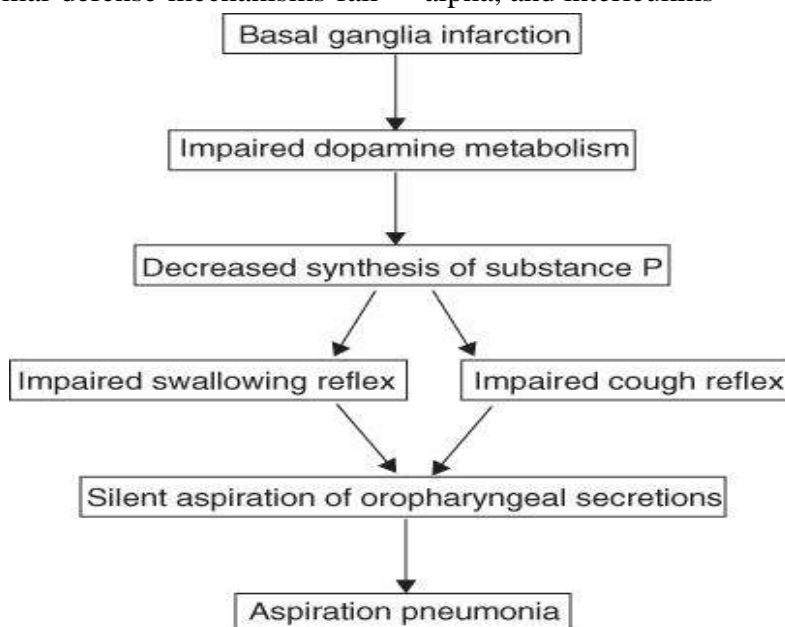


Fig.no. 10. Pathophysiology of aspiration pneumonia

The pathogenesis of ASP is well recognized as post-stroke pneumonia. Post-stroke pneumonia is a role model of the pathophysiology of ASP due to silent aspiration. The relationship between aspiration and ASP are summarized in Although no apparent aspiration was found by nurses and other medical staff, aspiration pneumonia is often observed in post-stroke patients. The chronic onset post-stroke pneumonia was closely associated with the silent aspiration or micro-aspiration during the night due to dysphagia. The understanding of the diversity of the mechanisms of aspiration pneumonia is important for applying the therapeutic and preventive strategies for post-stroke pneumonia in a variety of clinical settings. The Airway structure and the defence mechanisms are decisive in reducing aspiration episodes. An effective cough mechanism, mucociliary transport system, and normal function of the laryngeal tract allow good protection for this complication. Founded on a structural airway

analysis, some papers reported a more frequent incidence for the right lung than the left. In fact anatomically the right main bronchus shows a vertical positioning more than the left main bronchus, and this could promote aspiration episodes preferentially in the right lung. Some pathological conditions, acute or chronic, can predispose for aspiration pneumonia.

Signs and symptoms

Symptoms of aspiration pneumonia include:

1. Wheezing
2. slightly blue skin
3. sweating
4. fatigue
5. Difficulty in breathing

Diagnosis

1. Chest x-ray or computed tomography[CT]scan.
2. Blood test
3. Sputum tests
4. Bronchoscopy test

Risk factors

1. lung disease
2. dental problems
3. swallowing dysfunction
4. impaired consciousness
5. stroke

Treatment

1. uncomplicated cases: supportive measures such as air way clearance, oxygen supplementation, and positive pressure ventilation.
2. Antibiotics do not seem to alter the clinical outcome, including radiographic resolution, duration of hospitalization, or death rate, nor do they influence the subsequent development of infection.
3. Antibiotics includes ampicillin-sulbactam, cefepime, clindamycin.

CONCLUSION

Aspiration pneumonia generally implies acute lung infection that occurs after aspiration of oropharyngeal or upper gastro intestinal contents in large volumes. The aspirated contents are often not acidic enough [likely a PH much greater than 2.5] to induce chemical pneumonitis. silent aspiration of oropharynx bacterial pathogen to the lower respiratory tract is an important risk factor for nosocomial pneumonia. vaccines cannot be developed against every microbe. old microbes continuously changed and new once emerge .substances that stimulate immunity could also be employed to enhance the body`s response to vaccination. Corticosteroids have no proven benefit. Broad spectrum antibiotics are indicated in most patients with aspiration pneumonia

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