RESPIRATORY SYSTEM DISORDERS

OBJECTIVES

1. To describe the anatomy and physiology of the respiratory system.
2. To explain the major symptoms of respiratory system disorders.
3. To explain the investigative procedures for respiratory system disorders.
4. To describe the general management of respiratory system disorders.

OBJECTIVES CONT..

5. To describe the classification of the respiratory system disorders.
6. To describe the common respiratory system disorders *(definition, causes, pathophysiology, clinical features, complications and preventive measures).*
7. To describe the medical and nursing management of patients with common respiratory system disorders.

INTRODUCTION

1. Review Anatomy and physiology of the respiratory system:

- Nose and nasal cavity
- Pharynx
- Larynx
- Trachea
- Lungs
- Bronchi and bronchioles
- Process of respiration

2. Describe the following major symptoms of respiratory system disorders

- Dyspnea
- Orthopnea
- Cough
- Sputum production
- Chest pain
- Cyanosis
- Wheezing
- Clubbing of fingers
- Hemoptysis
- Cyanosis

3. Describe the following Investigative procedures for respiratory system disorders.

- History and physical exam
- Pulmonary function tests
- Arterial blood gases
- Pulse oxymetry
- Sputum studies
- Imaging studies
- Endoscopy procedures (laryngotracheobronchoscopy, thoracoscopy).
- Thoracentesis.
- Biopsy.

4. Describe the General management approaches to respiratory system disorders

- Positioning
- Chest physiotherapy (percussion, suctioning)
- Oxygen administration
- Under water seal drainage
- Tracheotomy
- Nursing, medical and surgical management.

5. Classification of respiratory system disorders:

i) Structurally:

- Upper respiratory disorders
- Lower respiratory disorders

ii) Pathologically:

- Infectious disorders (Viral and bacterial)
- Tumors (benign and malignant)
- Traumatic disorders of the respiratory system

iii) Physiologically :

a) Restrictive conditions

- Pneumonia
- Chest injury
- Pneumothorax
- Carcinoma of the lung
- Pleurisy

b) Obstructive conditions

- Bronchitis
- Chronic obstructive pulmonary diseases (chronic bronchitis & emphysema)
- Bronchial asthma
- Status asthmaticus
- Bronchiectasis
- Bronchiolitis

6. Traumatic disorders of the respiratory system

- Flail chest
- Pneumothorax
- Hemothorax

7. Tumors of the respiratory system

- Benign tumors of the respiratory tract
- Cancer of the larynx
- Cancer of the Lung

MAJOR SYMPTOMS OF RESPIRATORY DISEASES

DYSPNEA

- Difficulty in breathing or **labored breathing** or shortness of breath.
- Is a symptom common to many pulmonary and cardiac disorders, particularly when there is decreased lung compliance or increased airway resistance. E.g in **asthma**
- It may also be associated with neurologic or neuromuscular disorders such as **myasthenia gravis** and **Guillain-Barré syndrome**

Clinical Significance

- Acute diseases of the lungs produce a more severe grade of dyspnea than chronic diseases.
- Sudden dyspnea in a healthy person may indicate **pneumothorax , acute respiratory obstruction, or Respiratory distress syndrome (RDS)**.
- In immobilized patients, sudden dyspnea may denote pulmonary embolism.
- Orthopnea may be found in patients with heart disease and occasionally in patients with COPD;
- dyspnea with an expiratory wheeze occurs with COPD.

COUGH

- Results from irritation of the mucous membranes anywhere in the respiratory tract. by smoke, dust, or a gas.
- Cough is the chief **protection mechanism** against the accumulation of secretions in the bronchi and bronchioles.

Clinical Significance.

- Cough may indicate serious pulmonary disease.
- Described as dry, hacking, productive or severe.
- A dry, irritative cough is characteristic of an upper respiratory tract infection

Cont..

- Infection of viral origin causes an **irritative, high-pitched cough.**
- Pleuritic chest pain accompanying coughing may indicate **pleural involvement.**
- Cough in the morning with sputum indicate **bronchitis**
- Cough after food may indicate **aspiration in the tracheal bronchial tree**

SPUTUM PRODUCTION

- Sputum production is the reaction of the lungs to any constantly recurring irritant.

Clinical Significance

- A profuse amount of purulent sputum or a change in color of the sputum probably indicates a bacterial infection.
- Thin, mucoid sputum frequently results from viral bronchitis.
- Foul smelling sputum indicate indicate lung abcess or bronchiectasis

CHEST PAIN

- May be associated with **pulmonary or cardiac disease.**
- Chest pain associated with pulmonary conditions may be **sharp, stabbing, and intermittent**, or it may be **dull, aching, and persistent.**
- The pain usually is felt on the side where the pathologic process is located, but it may be referred elsewhere—for example, to the neck, back, or abdomen.

Clinical Significance.

- Chest pain may occur with pneumonia, pulmonary embolism with lung infarction, and pleurisy.
- **Pleuritic pain** is sharp and intensify on inspiration.

WHEEZING –

- is often the major finding in a patient with bronchoconstriction or airway narrowing.
- It is a high- pitched, musical sound heard mainly on expiration. Common in **asthma**
- Relief Measures: Oral or inhalant bronchodilator medications reverse wheezing in most instances.

CLUBBING OF THE FINGERS –

- Is a sign of lung disease found in patients with **chronic hypoxic conditions**, chronic lung infections, and malignancies of the lung.
- Manifested initially as loss of the nail bed angle

HEMOPTYSIS

- Is the expectoration of blood from the respiratory tract
- is a common symptom of pulmonary and cardiac disorders

The most common causes are:

- Pulmonary infection
- Carcinoma of the lung
- Abnormalities of the heart or blood vessels
- Pulmonary emboli and infarction
- Chest trauma

CYANOSIS

- Is a very late indicator of hypoxia (oxygen deficiency in body tissues).
- The presence or absence of cyanosis is determined by the amount of unoxygenated hemoglobin in the blood.

Two types:

- **Central cyanosis** is assessed by observing the color of the tongue and lips.
- **Peripheral cyanosis** results from decreased blood flow to a certain area of the body (e.g extremities)

DIAGNOSTIC PROCEDURES

1. **History and physical exam**
2. **Pulmonary Function Tests (PFTs)**

- Are routinely used in patients with chronic respiratory disorders.
- Performed to assess respiratory function and to determine the extent of dysfunction. Such tests include measurements of **lung volumes, ventilatory function**, and the **mechanics of breathing, diffusion, and gas exchange.**
- PFTs are useful in a patient with an established respiratory disease and assessing the response to therapy.

3. Arterial Blood Gases (ABGs)

- Involves measurements of blood pH and of arterial oxygen and carbon dioxide tensions.
- Arterial blood gas studies aid in assessing the ability of the lungs to provide adequate oxygen and remove carbon dioxide.

- Also involves the ability of the kidneys to reabsorb or excrete bicarbonate ions to maintain normal body pH.

4. Pulse Oximetry (SPO2)

- Pulse oximetry is a method of continuously monitoring the **oxygen saturation of hemoglobin**
- **A probe or sensor** is attached to the fingertip , earlobe, or bridge of the nose.

- Normal SpO2 values are **95% to 100%.** Values less than 85% indicate that the tissues are not receiving enough oxygen, and the patient needs further evaluation.

5. Sputum Studies

- Sputum is obtained for analysis to identify pathogenic organisms and to determine whether malignant cells are present.
- It also may be used to assess for hypersensitivity states
- In general, sputum cultures are used in **diagnosis, for drug sensitivity testing**, and **to guide treatment**

6. Imaging Studies

- This include x-rays, CT, MRI, Contrast studies, pulmonary angiography etc

7. Endoscopic Procedures

- *Bronchoscopy* is the direct inspection and examination of the larynx, trachea, and bronchi using a **bronchoscope**
- *Thoracoscopy* is a diagnostic procedure in which the pleural cavity is examined with an endoscope. It is primarily indicated in the diagnostic evaluation of pleural effusions and pleural disease

8. Thoracentesis –

- Aspiration of fluid from the chest by centesis for diagnostic or therapeutic purposes
- (**centesis** is the act of puncturing a body cavity or organ with a hollow needle in order to draw out fluid)

9. Biopsy

- The excision of a small amount of tissue, may be performed to permit examination of cells from the pharynx, larynx, and nasal passages.

CLASSIFICATION OF RESPIRATORY SYSTEM DISORDERS

COMMON DISORDERS OF THE LOWER RESPIRATORY TRACT

- Tracheitis
- Bronchitis
- Chronic obstructive pulmonary disease
- Asthma
- Bronchiectasis
- Cystic fibrosis
- Pneumonia
- Tuberculosis
- Lung abscess
- Atelectasis
- Pleural effusion

CLASSIFICATION OF RESPIRATORY DISORDERS / CONDITIONS

Restrictive conditions

i. Pneumonia
ii. Chest injury
iii. Pneumothorax
iv. Carcinoma of the lung
v. Pleurisy

Obstructive conditions

i. Bronchitis
ii. Chronic obstructive pulmonary diseases *(chronic bronchitis & emphysema)*
iii. Bronchial asthma
iv. Status asthmaticus
v. Bronchiectasis
vi. Bronchiolitis

PNEUMONIA

Definition: Pneumonia is an inflammation of the lung parenchyma *(the cells and tissues concerned with lung functions)*, caused by various microorganisms, including bacteria, mycobacteria, fungi, and viruses.

CLASSIFICATION OF PNEUMONIA

Pneumonia is classified according to:

i) **The predisposing environment.**

ii) **The pattern of damage executed in the lungs.**

Classification of pneumonia according to the predisposing environment:

i) Community acquired pneumonia
ii) Hospital acquired pneumonia
iii) Pneumonia in the immunocompromised patient
iv) Aspiration pneumonia

1. COMMUNITY-ACQUIRED PNEUMONIA (CAP)

- Is pneumonia occurring in the community setting or within the first 48 hours after hospitalization

- The causative agents for CAP that requires hospitalization include ***Streptococcus pneumoniae, H. influenzae, Legionella, Pseudomonas aeruginosa, and Mycoplasma pneumonia .***

- This pneumonia may occur as **lobar or as bronchopneumonia** in patients of any age and may follow a recent respiratory illness.
- *S. pneumoniae (pneumococcus) is the most common cause* of CAP in people younger than 60 years of age without co-morbidity, and in those 60 years and older with co-morbidity.

- Viruses are the most common cause of pneumonia in infants and children but are relatively uncommon causes of CAP in adults.

2. HOSPITAL-ACQUIRED PNEUMONIA (HAP)

- HAP, also known as **nosocomial** pneumonia, is defined as the onset of pneumonia symptoms more than 48 hours after hospital admission in patients with no evidence of infection at the time of admission.

- It is the most lethal nosocomial infection and is the **leading cause of death** in patients with such infections.

Predisposing factors to hospital-acquired pneumonia:

i) Impaired host defenses (malnutrition, immunocompromised patients are at particular risk).

ii) Co-morbid conditions (e.g. metabolic disorders e.g Diabetes, sewere acute or chronic illnesses).

iii) Prolonged hospitalization (transmission of pathogens by the hands of health care personnel).

vi) Intervention-related factors also may play a role in the development of HAP:

- ***Prolonged or inappropriate use of antibiotics.***
- ***Use of nasogastric tubes.***
- ***Endotracheal intubation.***

Common causative organisms for HAP include ***E. coli, H. influenzae, Klebsiella species, Proteus, Pseudomonas aeruginosa, methicillin-sensitive or methicillin-resistant Staphylococcus aureus (MRSA), and S. pneumoniae.***

3. PNEUMONIA IN THE IMMUNOCOMPROMISED HOST

Occurs due to:

i) Prolonged use of corticosteroids or other immunosuppressive agents.

ii) Chemotherapy.

iii) Nutritional depletion.

iv) Prolonged use of broad spectrum antibiotics.

v) Acquired immunodeficiency syndrome (AIDS).

vi) Genetic immune disorders.

vii) Long-term advanced life-support technology (mechanical ventilation).

- Pneumonia in immunocompromised hosts includes ***Pneumocystis carinii* pneumonia** (PCP), fungal pneumonias etc
- The organisms responsible for CAP and HAP can also cause pneumonia in the immunocompromised hosts.
- PCP is rarely observed in immunocompetent hosts and is often an initial AIDS-defining complication.

4. ASPIRATION PNEUMONIA

- Aspiration pneumonia refers to the pulmonary consequences resulting from entry of endogenous or exogenous substances into the lower airway.
- Aspiration pneumonia can occur in the community or in the hospital setting.

Forms of aspiration pneumonia include:

i) Aspiration of bacteria that reside in the upper airways, leading to infection. Common pathogens are *S. pneumoniae, H. influenzae, and S. aureus.*

ii) Substances other than bacteria aspirated into the lungs, such as gastric contents

- These substances impair lung defenses, cause inflammatory changes, and lead to bacterial growth resulting in pneumonia.

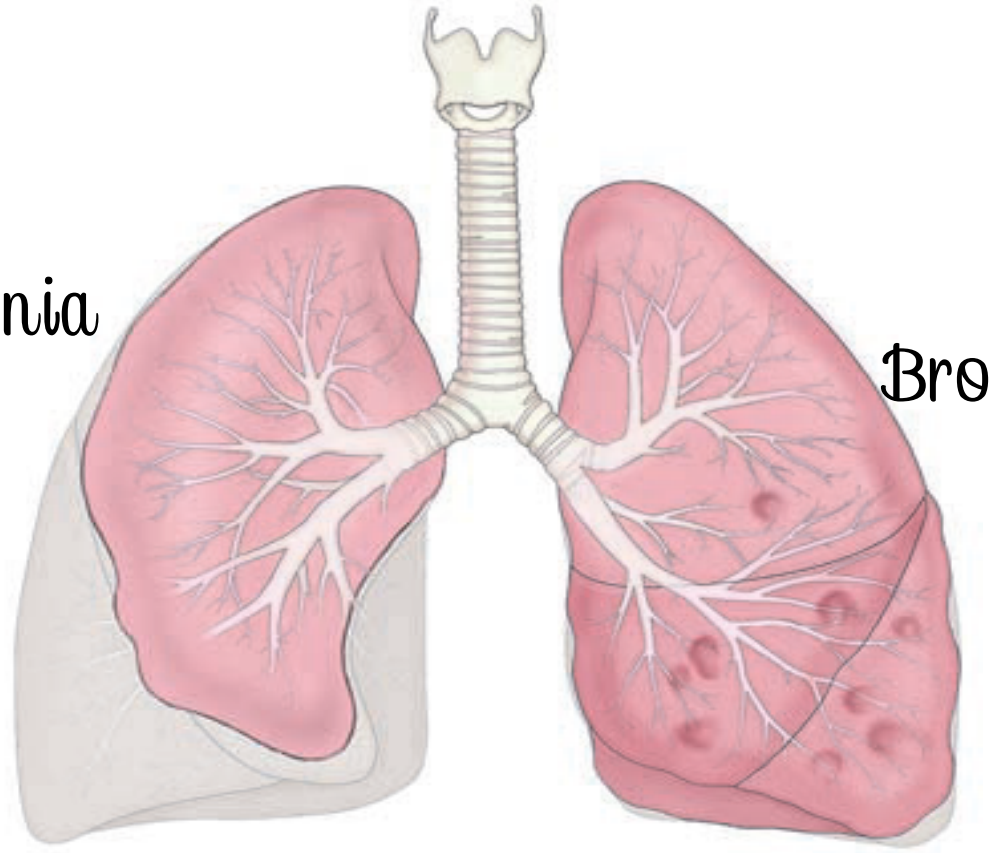
Classification of pneumonia according to the pattern of damage executed in the lungs:

i) **Lobar pneumonia:** Refers to the pneumonia in which a substantial portion of one or more lobes of the lungs is involved.

ii) **Bronchopneumonia:** The disease is distributed in a patchy fashion, originating from one or more localized areas within the bronchi and extending to the adjacent surrounding lung parenchyma. (lung tissue)

LOBAR PNEUMONIA vs BRONCHOPNEUMONIA

Lobar pneumonia



Bronchopneumonia

In lobar pneumonia, *an entire lobe is* consolidated, while in bronchopneumonia, *patchy areas of* consolidation occur.

RISK FACTORS TO PNEUMONIA

1. **Conditions that produce mucus or bronchial obstruction** and interfere with normal lung drainage (eg, cancer, cigarette smoking and COPD).
2. **Immunosuppression**
3. **Cigarette smoking;** cigarette smoke disrupts both mucociliary and macrophage activity.
4. **Prolonged immobility**
5. **Subsequent placement** of nasogastric or endotracheal tubes.

6. **Depressed cough reflex** (eg, in weak respiratory muscles);
7. **Aspiration of foreign material** into the lungs during periods of unconsciousness (head injury, anesthesia, altered level of consciousness), or abnormal swallowing mechanism.
8. **Alcohol intoxication**: Alcohol suppresses the body's reflexes leading to aspiration. It also decreases tracheobronchial ciliary motion.
9. **Advanced age**, because of possible depressed cough and glottic reflexes and nutritional depletion.

10. **Respiratory therapy** with improperly sterilized equipment.
11. **Transmission** of organisms from health care providers.

PATHOPHYSIOLOGY OF PNEUMONIA

- Pneumonia is an inflammation of the lung parenchyma caused by various microorganisms (bacteria, mycobacteria, fungi, and viruses), most common being *S. pneumoniae, H. influenzae, S. aureus, and Pneumocystis jirovecii.*
- It arises from normal flora present in patients with altered immunity or from aspiration of flora present in the oropharynx due to acute or chronic underlying disease that impairs host defenses.
- Pneumonia may also result from bloodborne organisms that enter the pulmonary circulation and are trapped in the pulmonary capillary bed.

- The invasion of lung tissues with bacteria and viruses affects gaseous exchange, through an inflammatory reaction that occur in the bronchi and in the alveoli causing formation of inflammatory exudate.
- White blood cells, mostly neutrophils, migrate into the alveoli and fill the normally air-filled spaces. The mucosal edema and the exudate (secretions) causes partial occlusion of the bronchi and the alveoli. The exudate also interferes with the diffusion of O_2 and CO_2.
- All these results in poor ventilation of the lung parenchyma

- Bronchial exudate production leads to mucoid or mucopurulent sputum production while the airway irritation causes reflex coughing.
- As a compensatory mechanism to tissue hypoperfusion, breath rates increases to between 25 and 45 b/min, causing shortness of breath
- With improper or delayed treatment, pneumonia can complicate to pleural effusion, hypotension, shock and respiratory failure.

CLINICAL MANIFESTATIONS OF PNEUMONIA

- Shaking chills
- Fever
- Dry cough
- Muscle aches
- Nausea/vomiting
- Rapid breathing
- Rapid heartbeat
- Difficulty breathing
- Chest pain

ASSESSMENT AND DIAGNOSTIC PROCEDURES

i) **Patient history:** positive history of a recent respiratory tract infection.

ii) **Physical examination:** reveals **percussion dullness; crackles** on auscultation reveals fluid in narrow airways.

iii) **Chest x-rays:** reveals areas of opacity which represent lung tissue consolidation.

iv) **Blood culture** to reveal bacteremia.

v) **Pulse oximetry and arterial blood gas analysis** is used to determine the patient's oxygenation and acid–base status.

vi) Sputum examination (for microscopy or culture).

vii) Bronchoscopy may reveal narrow inflamed and exudate-filled bronchials.

MANAGEMENT OF PNEUMONIA

PHARMACOTHERAPY

Antibiotic therapy

i) Macrolides (azithromycin, clarithromycin, or erythromycin)

ii) Beta-lactam agent (cefpodoxime or cefuroxime)

iii) Fluoroquinolone (moxifloxacin, gemifloxacin, or levofloxacin)

iv) Aminoglycosides

v) **In HAP or nosocomial pneumonia** with no known multidrug resistance, monotherapy with ceftriaxone, or with levofloxacin is used.

Other management

i) **Hydration** (with oral fluids or intravenously if patient is NPO)

ii) **Antipyretics** (paracetamol) are used to treat headache and fever.

iii) **Antitussive medications** (codeine or dextromethorphan) are used for the associated cough.

iv) Bed rest is prescribed until the infection shows signs of clearing.

v) **Oxygen** is administered if hypoxemia develops.

vi) Improving Airway Patency:

- ✓ The nurse **encourages hydration** (2 to 3 L/day), because adequate hydration thins and loosens pulmonary secretions.
- ✓ **Coughing** can be initiated either voluntarily or by reflex. The nurse encourages the patient to perform an effective, directed cough
- ✓ **Chest physiotherapy** (percussion) is important in loosening and mobilizing secretions.

viii) Oxygen administration

Administer oxygen therapy as prescribed.

viii) Promote rest and conserve patient energy

Place the patient in a comfortable position to promote rest and breathing (eg, semi-fowler's position)

ix) Maintaining adequate nutrition

x) Promoting patients' and family knowledge on pneumonia.

xi) Monitoring and managing potential complications, such as shock, pleural effusion, confusion and respiratory failure.

PREVENTION OF PNEUMONIA

- Don't smoke.
- Practice good hygiene.
- Stay rested and fit.
- Appropriately treating underlying illnesses (such as HIV/AIDS, diabetes mellitus, and malnutrition) can decrease the risk of pneumonia.
- Pneumonia Vaccination. (pneumococcal vaccine)

COMPLICATIONS

- Bacteria in the bloodstream (bacteremia)
- Lung abscess.
- Build up of fluid in the space between the lung and chest wall (pleural effusion).
- Difficulty breathing.
- Shock and respiratory failure
- Septic arthritis
- Endocarditis

PLEURISY

INTRODUCTION

- **Definition:** Pleurisy is the Inflammation of the pleura of the lungs (especially the parietal layer)

- It is most often caused by a viral infection.
- Various other lung disorders can also cause a **'pleuritic pain'** similar to pleurisy.
- A pleuritic pain is a chest pain which is typically sharp and 'stabbing' in a part of the chest. The pain is usually *made worse when breathing in or coughing.*

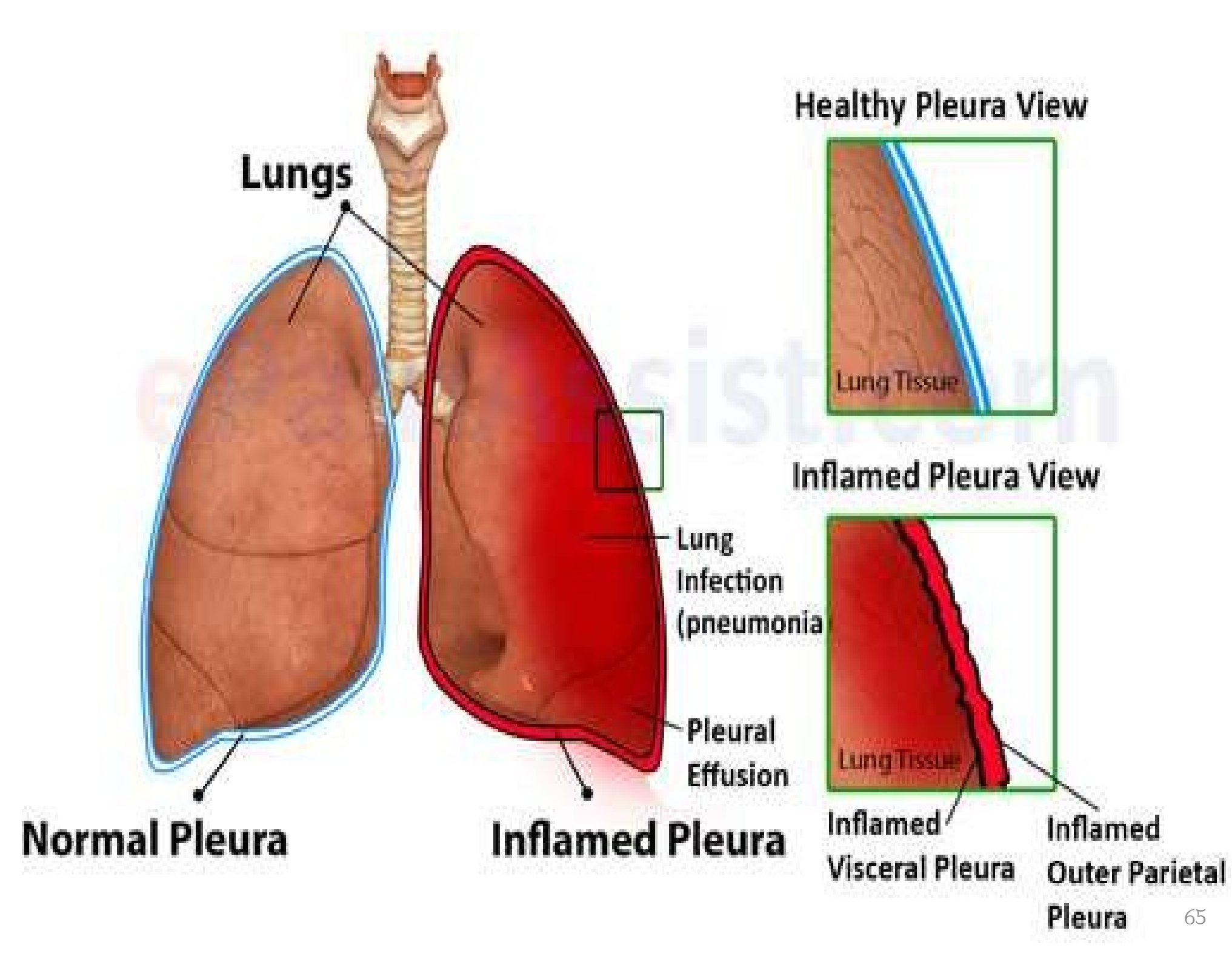
PLEURA

- Pleura are thin serous membrane around the lungs and inner walls of the chest. There are **<u>two layers.</u>**

- One layer lines the inside of the chest wall. The other layer covers the lungs.

- Between the two layers of pleura (the pleural cavity) , is a serous fluid called pleural fluid.

- This helps the lungs and chest wall to move smoothly when breathing.


Lungs
Healthy Pleura View
Lung Tissue
Inflamed Pleura View
Lung Infection (pneumonia
Pleural Effusion
Lung Tissue
Normal Pleura
Inflamed Pleura
Inflamed Visceral Pleura
Inflamed Outer Parietal Pleura

SIGNS AND SYMPTOMS

- Pain on one side of the chest (unilateral)
- Pain in the shoulders and back (referred pain)
- Shallow breathing to avoid feeling pain
- Headaches
- Joint pain
- Muscle aches
- Shortness of breath
- Intercostal tenderness on palpation.
- Evidence of infection; fever, malaise, increased white cell count

CAUSES

- Bacterial infections such as pneumonia and tuberculosis
- A chest wound that punctures the pleural cavity
- A pleural tumor
- Lung cancer
- Autoimmune disorders, like rheumatoid arthritis
- Pulmonary embolism
- A heart surgery complication
- A fungal or parasitic infection of pleura
- Complication of thoracotomy procedure

(thoracotomy – is a surgical incision into the chest walls opening up the pleural cavity)

DIAGNOSIS

- Chest x-ray
- Blood test
- **Thoracentesis** - Removal of fluid from the chest by centesis for diagnostic or therapeutic purposes. *Centesis is the act of puncturing a body cavity or organ with a hollow needle in order to draw out fluid*
- Ct-scan
- Ultrasound
- Biopsy
- Thoracoscopy

MANAGEMENT

- The objectives of treatment are to discover the underlying cause and to relieve the pain.
- **Treatment for the underlying primary disease** (e.g pneumonia)

- Inflammation of pleura usually resolves when the primary disease subsides

- **Antibiotics** for bacterial infection

- **Antiinflammatory drugs** including aspirin, ibuprofen etc

- Prescription of **pain and cough medication** to promote comfort.
- Medications to **clear any blood clots** e.g heparin
- Large collections of pus is then drained out via a tube **(chest tube)**

- **Bronchodilators** via metered dose inhaler (MDI) devices, such as those used to treat asthma. E.g salbutamol
- Evaluate patient for signs of hypoxia

Easing Painful Respiration

- **Assist patient to find comfortable position** that will promote respiration; lying on affected side decreases stretching of the pleura and, therefore, the pain decreases.

- **Instruct patient on splinting the chest while taking a deep breath or coughing**
- **Administer pain medications** as prescribed.
- Assist with intercostal nerve block if indicated.

COMPLICATIONS

- Severe pleural effusion.
- Atelectasis (Collapse of an expanded lung)

CHEST INJURIES

Initial Assessment

A. **A**irway with *cervical spine* protection
B. **B**reathing
C. **C**irculation with *haemorrhage control*
D. **D**isability or neurological status
E. **E**xposure and Environment – remove clothing, but keep warm

Recognition of (Clinical Features)

❖ **LOOK** → **LISTEN** → **FEEL** →

LOOK

- ***Respiratory rate***
- ***Shallow, gasping or laboured breathing***: Respiratory failure?
- ***Cyanosis***: Hypoxia
- ***Unequal chest inflation:*** Pneumothorax or Flail chest?
- ***Bruising or contusion:*** 'Seat-Belt' sign.
- ***Penetrating chest injury***
- *Distended neck veins: venous return or cardiac tamponade* ***(cardiac tamponade: Mechanical compression of the heart resulting from large amounts of fluid collecting in the pericardial space and limiting the heart's normal range of motion)

LISTEN

- ***Absent breath sounds:*** Apnoea or tension pneumothorax
- ***Noisy breathing/ Crepitations/ Stridor/ Wheeze:*** Partially obstructed airway
- ***Reduced air entry:*** Pneumothorax, Haemothorax, Heamo-pnemothorax, flail chest

FEEL

- ***Tracheal deviation***
- ***Tenderness:*** Chest wall contusion and/ rib fracture

1. Rib fracture

- 1st and 2nd ribs are protected by clavicle: when fractured it could be life threatening as trauma to the thoracic aorta, brachial plexus or subclavian vein is likely.

- 11th and 12th ribs are floating ribs, usually not fractured

- Ribs in children are more elastic thus great force is needed to cause fractures

Types of trauma

a) CLOSED INJURY TO THE CHEST

- ✓ **Direct trauma** - Single or multiple ribs fractured at the point of contact
- ✓ **Crush injury** - Usually causes flail chest due to multiple sites of fracture of ribs ***(Flail chest: Loss of stability of chest wall as a result of multiple rib fractures)***
- ✓ **Steering wheel injury** - Common in head-on-collision accidents where fracture of sternum and bilateral fractures of ribs occur at costochondral junction

✓ **Minor trauma** - In osteoporotic ribs, sometimes even a cough can cause a rib fracture

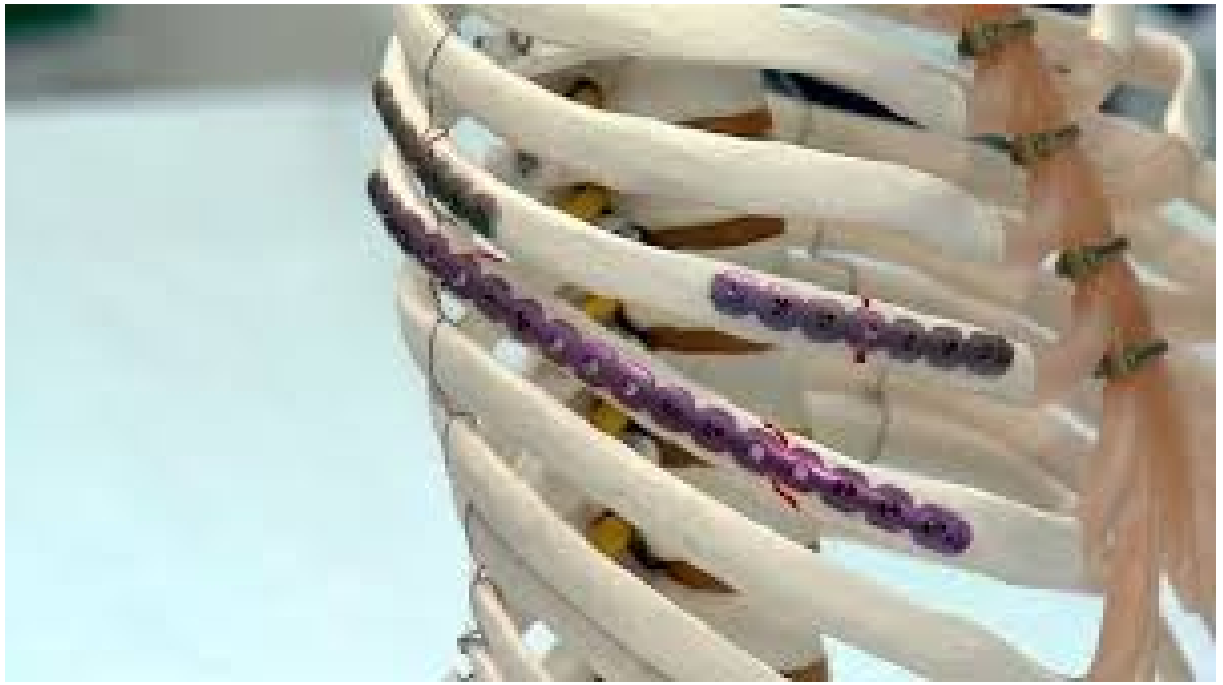
Clinical features

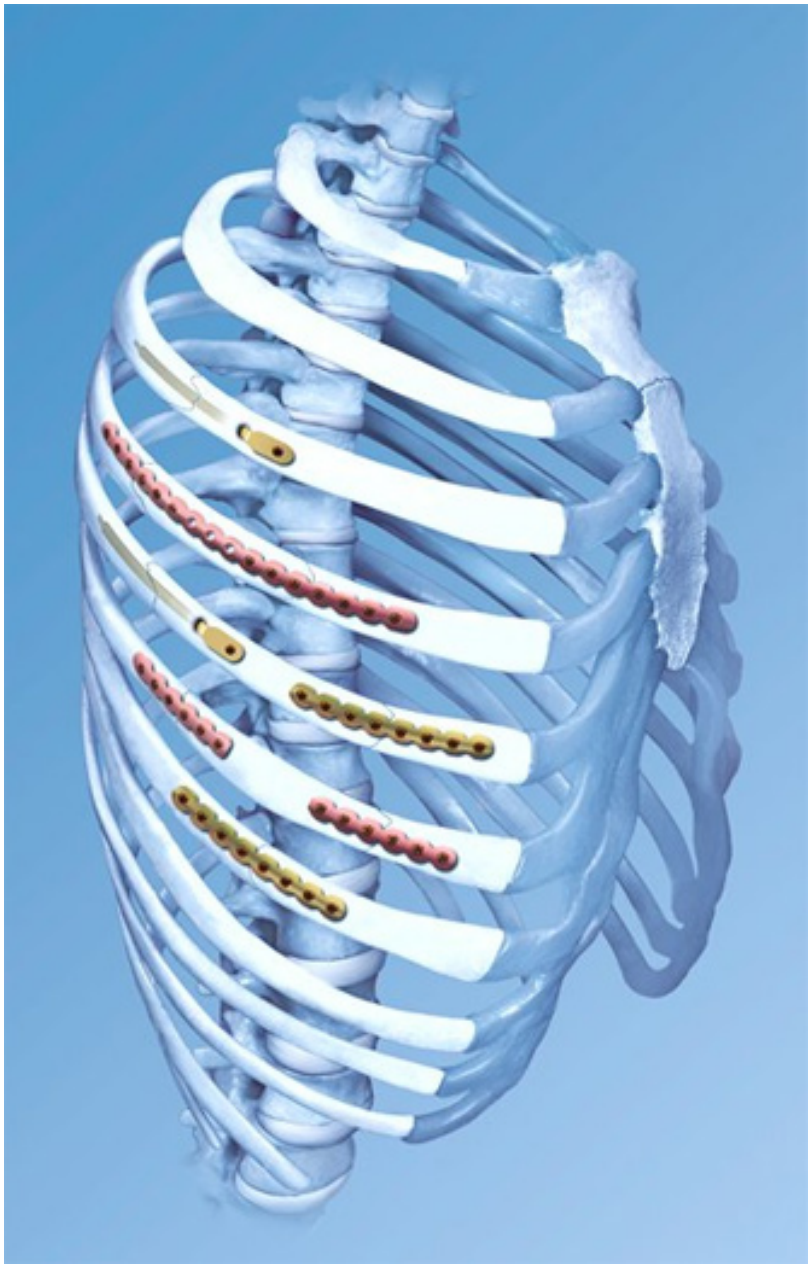
- **In rib fracture without complication:** Pain while taking a deep breath and exaggerated pain during coughing
- **Inspection**: Bruising on skin
- **Palpation**: Bony irregularity, Tenderness and Crepitus
- **X-ray** usually shows a fracture rib but may miss a hairline fracture (tiny fractures)

Manangement of uncomplicated rib fracture

- Reduction of pain with 2 week follow up
- **Analgesics** :
  - Opiods
  - NSAID's
- **Strapping of chest:** relieves pain by immobilizing the ribs
- **Breathing exercises**

Surgical treatment





b) PENETRATING TRAUMA

Causes

- High speed projectiles like gunshot
- Splinters from blasts
- Stab injury

Consequences

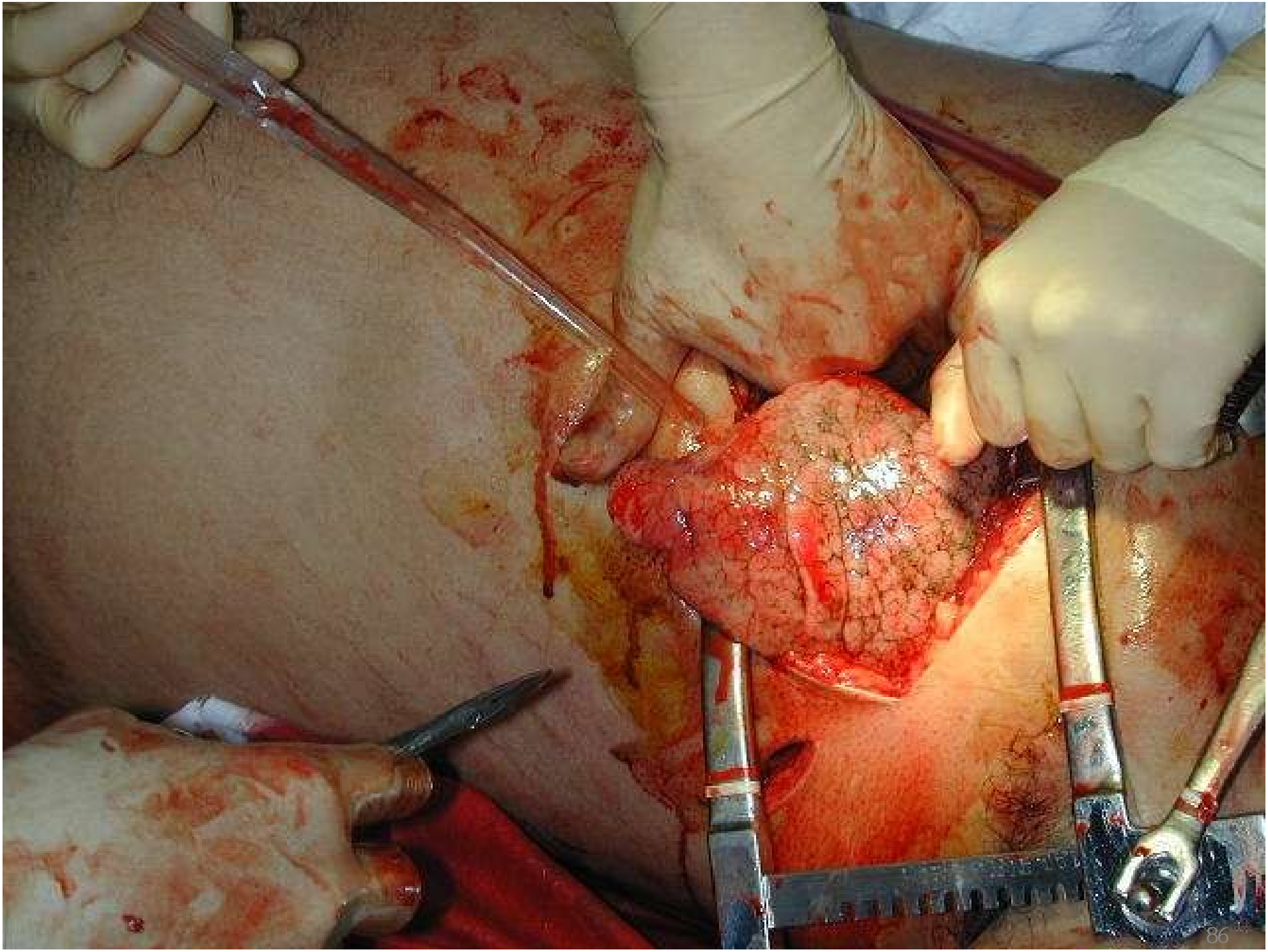
- Pneumothorax
- Hemothorax
- Trauma to the heart and great vessels
- Pericardial tamponade
- Oesophageal injury
- Pulmonary contusion
- Lung laceration
- Rupture of the diaphragm

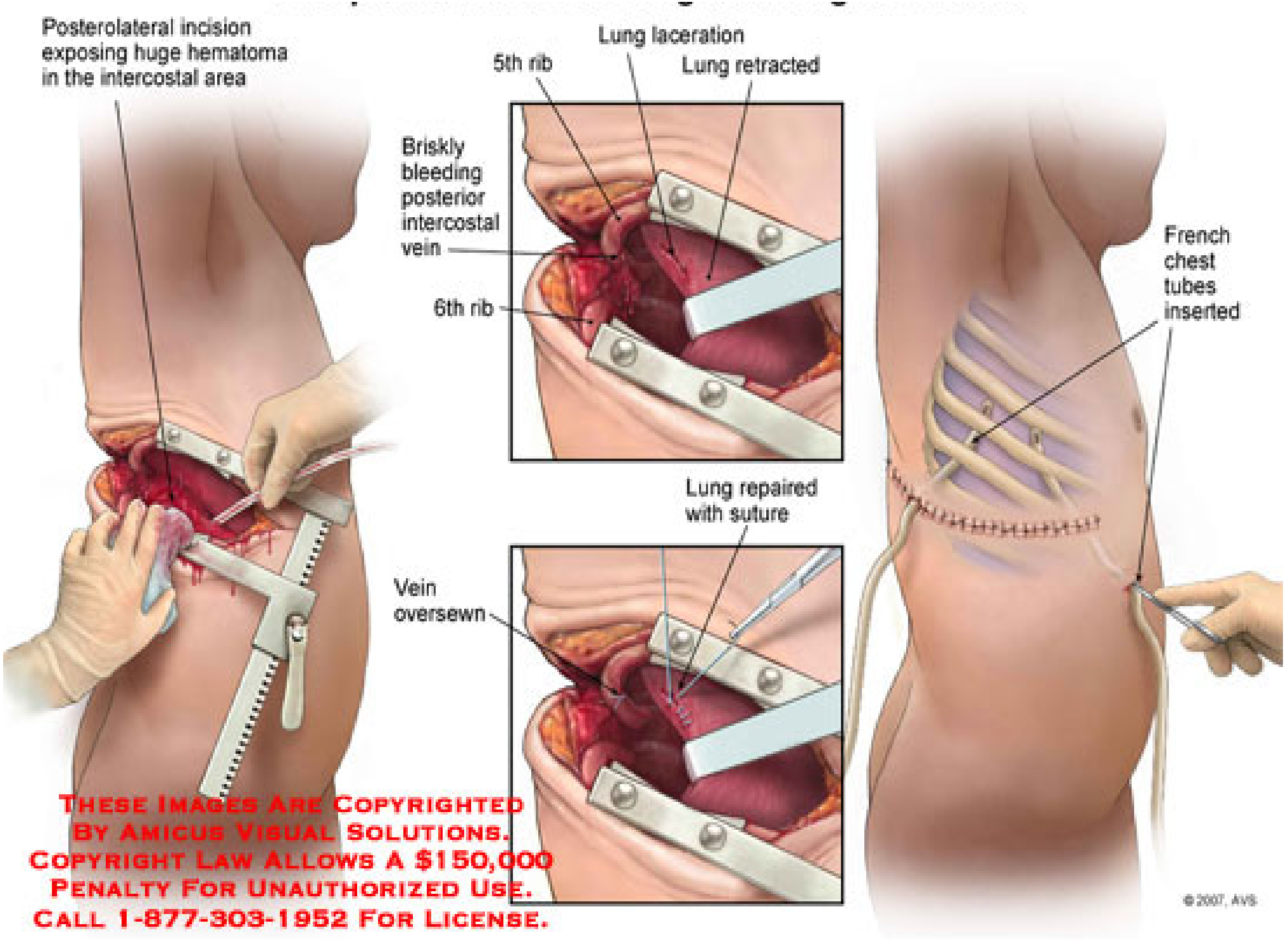
Indications for thoracotomy

1. Internal cardiac massage
2. Control of haemorrhage from injury to the heart
3. Control of haemorrhage from injury to the lungs/intrapleural haemorrhage
4. Ruptured oesophagus
5. Control of massive air leak
6. Traumatic diaphragmatic tear

- Thoracotomy can be
  - **Emergency**:-for control of life threatening bleeding
  - **Planned**:-for repair of specific injury

- Approaches:
  - Left anterolateral
  - Right anterolateral
  - Median sternotomy





2. Flail Chest

- **Definition**: Loss of stability of chest wall as a result of multiple rib fractures

- "A flail chest segment is formed when *two or more consecutive ribs*, with each rib being fractured at *two or more sites*"

- **Stove-in-chest**: "Depression of a portion of the chest wall due to severe chest injury, which contributes to forming a flail segment."

Complications

- The **early mortality** attributable to the flail chest syndrome is due to:
  - Massive haemothorax and Pulmonary contusion

- Whereas **late mortality** is largely due to:
  - Adult respiratory distress syndrome (ARDS) and associated infections.

Investigations

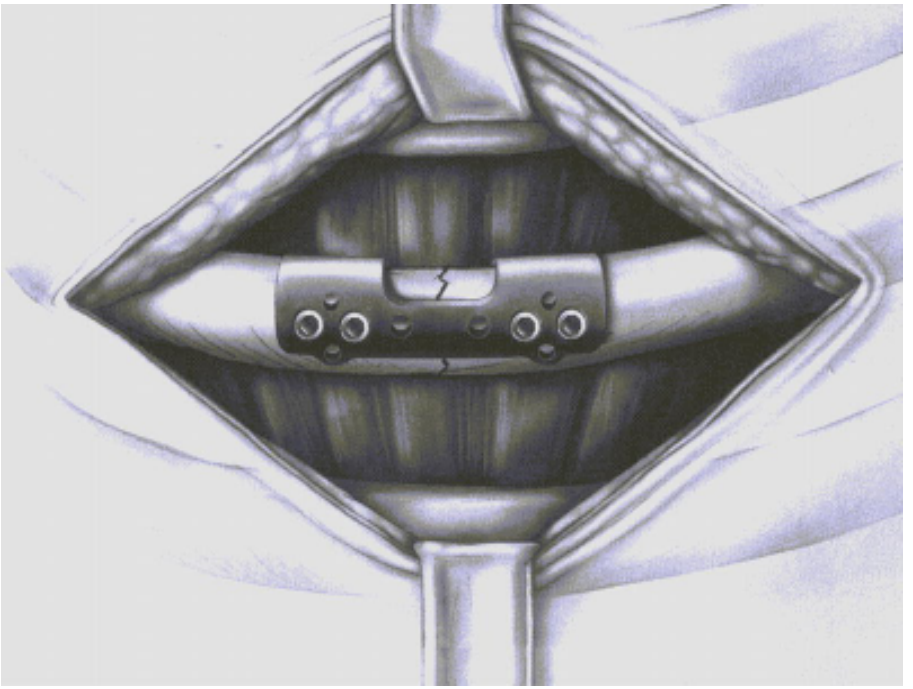
1. Vital signs
2. Chest X-Ray
3. ECG
4. Pulse oximetry
5. Arterial Blood Gas
6. Fluid monitoring: urinary catheterization

Management

- Principles of the initial management of simple rib fractures with flail segments are considered.
- Minimise further lung injury (immobility)
- Secure and support the airway as indicated
- Analgesia
- Mechanical ventilation
- Administration of humidified oxygen
- Monitor SPO2
- Secure one or more I.V. lines for fluid replacement (cautious fluid resuscitation)
- Obtain blood for baseline studies, such as hemoglobin level

Surgical Intervention

- Internal fixation of flail segment.

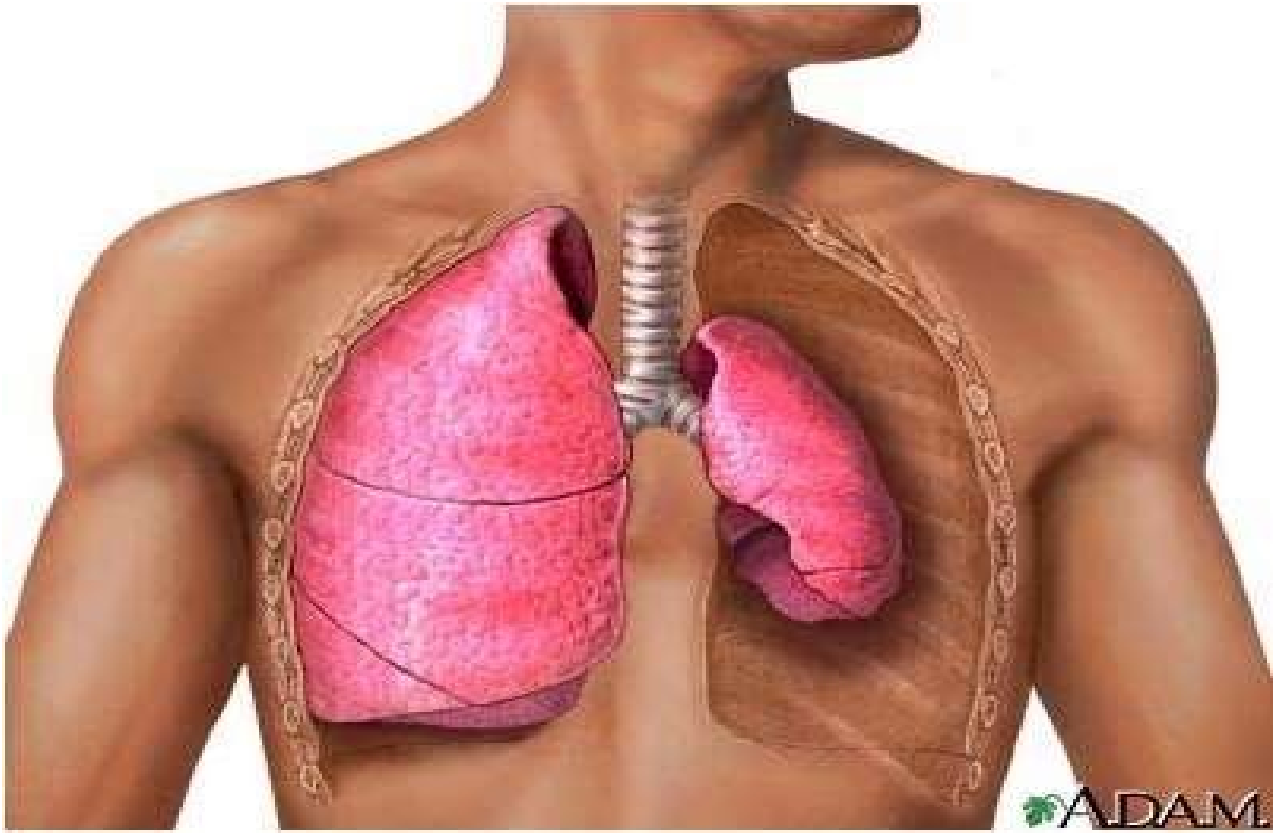


Bulky Dressing for splint of FlailChest

- Use Trauma bandage and Triangular Bandages to splint ribs.

D5W on area and tape down. (The only good use of D5W I can find)

PNEUMOTHORAX



- **Definition1**:Abnormal presence of air in the pleural cavity resulting in the collapse of the lung.

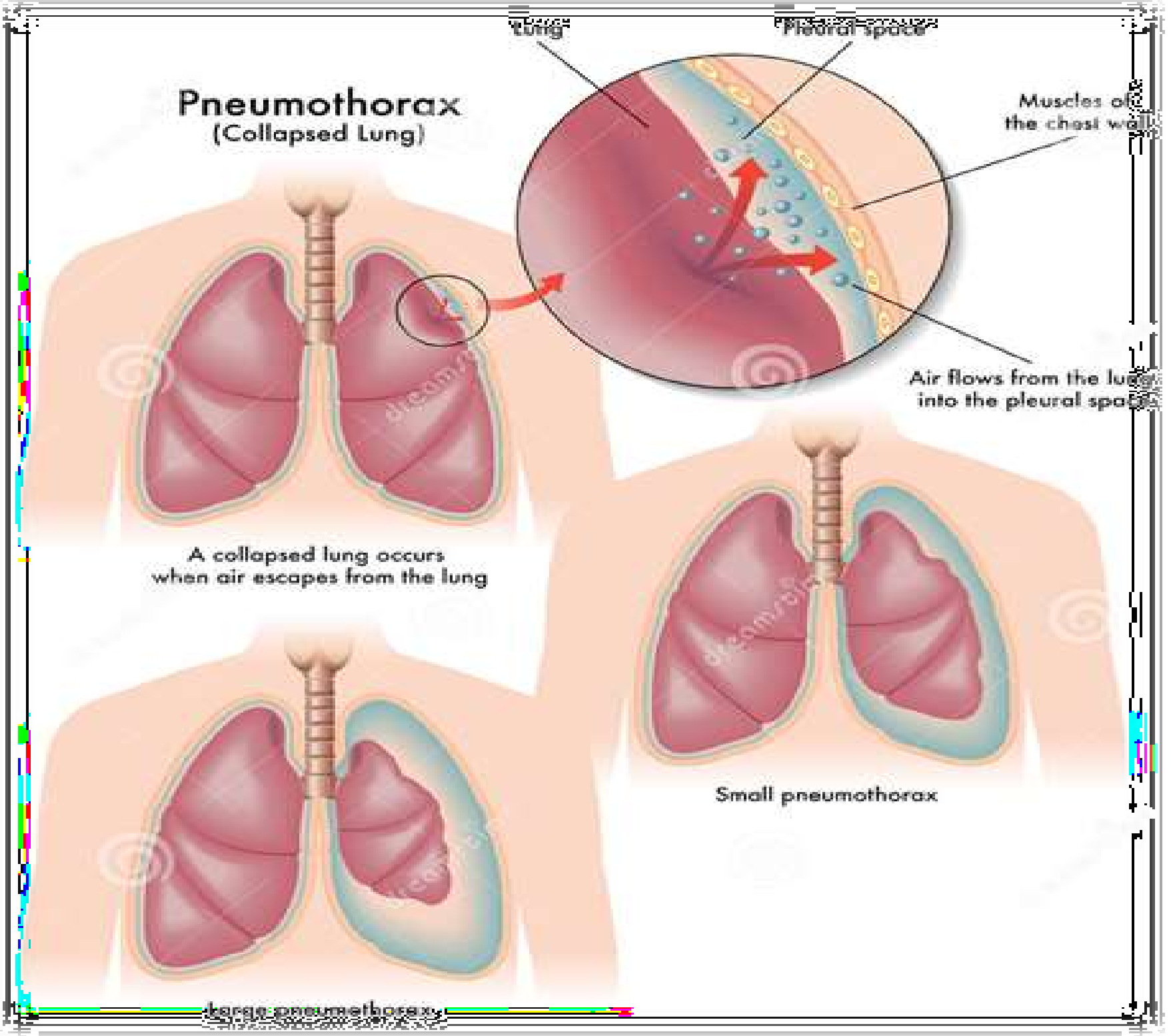
- **Definition 1**: A pneumothorax is an abnormal collection of air in the pleural space between the lung and the chest wall

Mechanism:

- In normal people, the pressure in pleural space is negative during the entire respiratory cycle.
- Two opposite forces result in negative pressure in pleural space.

(outward pull of the chest wall and elastic recoil of the lung)

- The negative pressure will disappear if any communication (space) develops .
- When a space develops between an alveolus and pleural space, air will flow into the pleural space until there is no longer a pressure difference or until the space is sealed.


Pneumothorax
(Collapsed Lung)
Lung
Pleural space
Muscles of the chest wall
Air flows from the lung into the pleural space
A collapsed lung occurs when air escapes from the lung
Small pneumothorax
Large pneumothorax

Types of pneumothoraces

i) Primary Spontaneous Pneumothorax (PSP)

- A primary spontaneous pneumothorax (PSP) tends to occur in young adults without underlying lung problems, and usually causes limited symptoms.
- Chest pain and sometimes mild breathlessness are the usual predominant presenting features

ii) Secondary Spontaneous Pneumothoraces (SSPs)

- Occur in individuals with significant underlying lung disease.
- Symptoms tend to be more severe than in PSP, as the unaffected lungs are generally unable to replace the loss of function in the affected lungs.
- **Hypoxemia** (decreased blood-oxygen levels) is manifested as cyanosis (blue discoloration of the lips and skin).

iii) Traumatic Pneumothorax

- Traumatic pneumothorax most commonly occurs when the chest wall is pierced, such as when a **stab wound or gunshot wound** allows air to enter the pleural space, or because some other mechanical injury to the lung compromises the integrity of the involved structures.

Tension Pneumothorax

- Generally presents when a pneumothorax (primary spontaneous, secondary spontaneous, or traumatic) leads to significant impairment of respiration and/or blood circulation.
- The most common findings: **chest pain and respiratory distress, tachycardia, tachypnea**

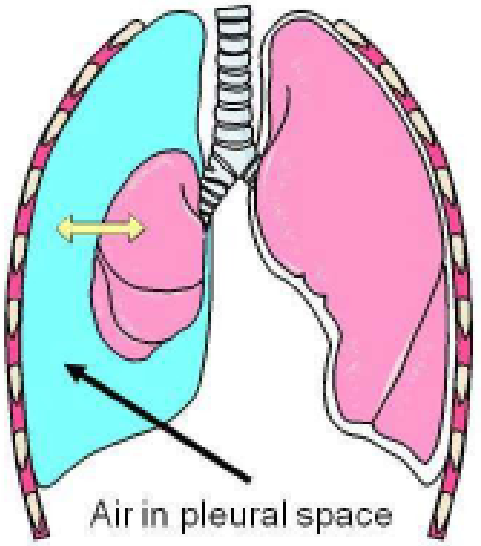
Other findings may include:

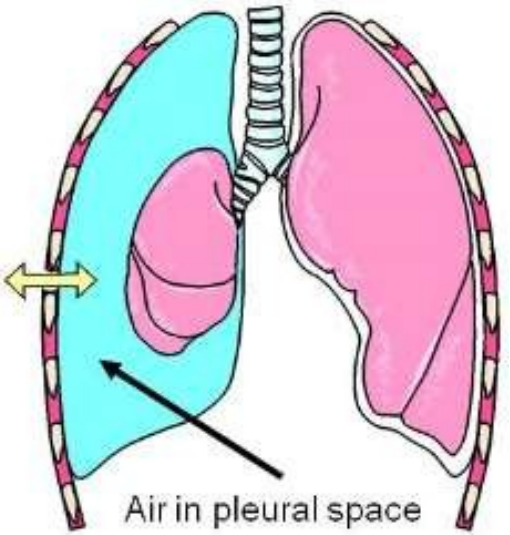
- *Quieter breath sounds on one side of the chest,*
- *Low oxygen levels and Low blood pressure,*
- *cyanosis*
- *Altered level of consciousness*

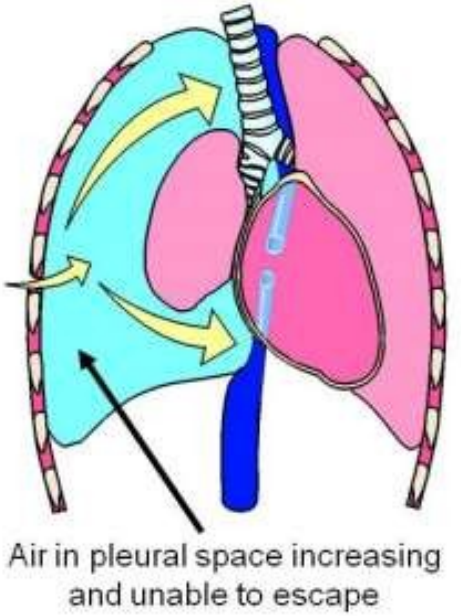
Clinical types of Pneumothorax

Pneumothorax

- **Closed** pneumothorax
- **Open** pneumothorax
- **Tension** pneumothorax







General Signs and symptoms

- Breath sounds (with a stethoscope) may be **diminished** on the affected side.
- **Percussion** of the chest may be perceived as hyper-resonant (like a booming drum).
- **Dyspnea**
- **Chest pain** (pleuritic pain)
- Rare signs and symptoms include: Cough, Hemoptysis, Cyanosis, Tachycardia

Physical signs may not be apparent if the pneumothorax is relatively small

Physical examination:

- Depend on size of pneumothorax
- The vital signs usually normal
- Unilateral Chest movements
- The percussion note is hyper-resonant
- The breath sounds are reduced or absent on the affected side
- The lower edge of the liver may be shifted inferiorly with a right-side pneumothorax

Diagnostic procedures

- Xray, Ct scan, Ultrasound

Management

- In **TRAUMATIC PNEUMOTHORAX**, chest tubes are usually inserted.
- If mechanical ventilation is required, the **risk of** tension pneumothorax is greatly increased and the insertion of a chest tube is mandatory.
- Any open chest wound should be covered with an airtight seal, as it carries a high risk of leading to tension pneumothorax.

- **TENSION PNEUMOTHORAX** is usually treated with urgent needle decompression.
- The needle or cannula is left in place until a chest tube can be inserted.

OTHER TREATMENTS

Aspiration

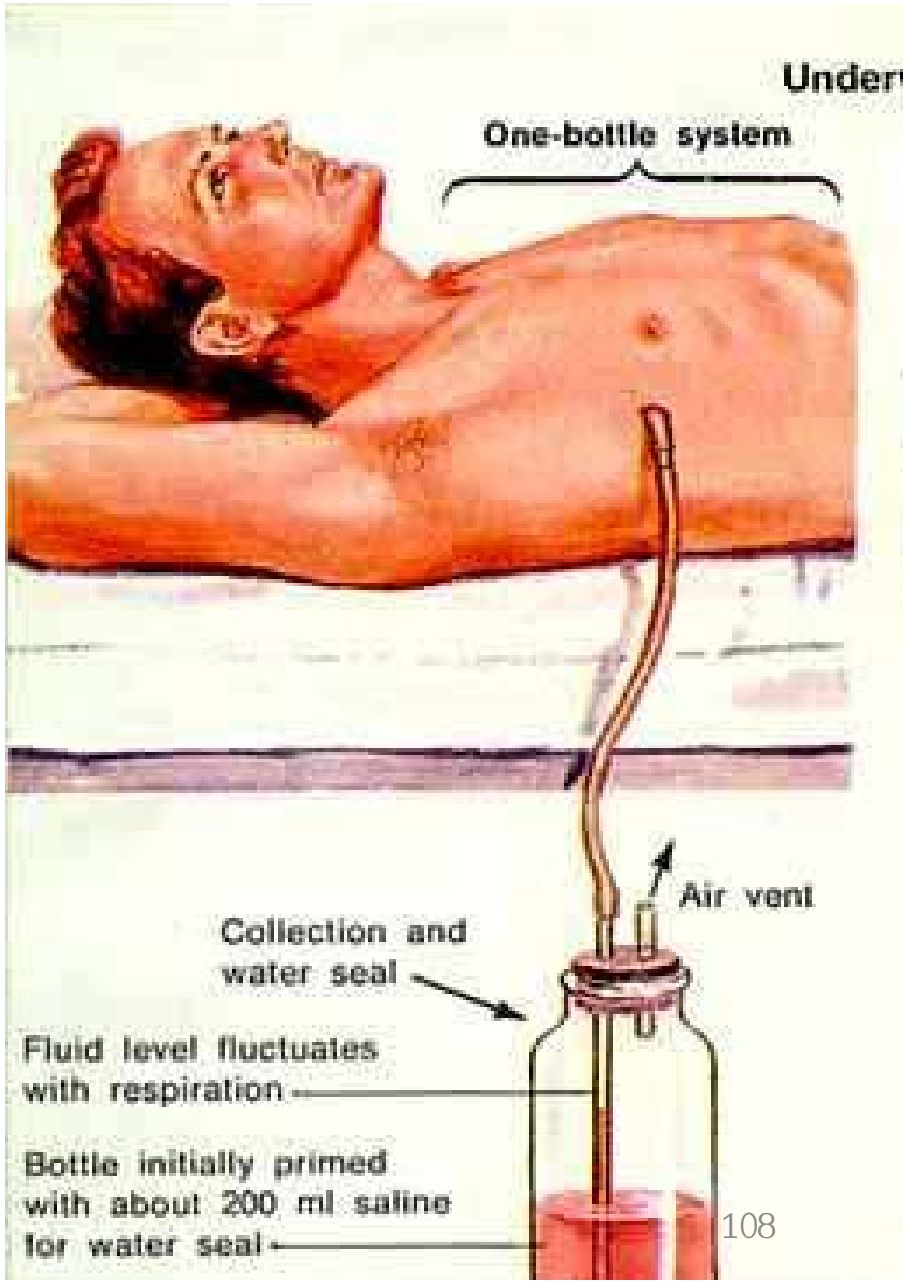
- Reducing the size of pneumothorax by aspiration is equally effective as the insertion of a chest tube.
- This involves the administration of local anesthetic and inserting a needle connected to a three-way tap; up to 2.5 liters of air (in adults) are removed.

Chest tube

- **A chest tube (or intercostal drain)** is the most definitive initial treatment of a pneumothorax.
- These are typically inserted in an area under the axilla (armpit) called the **"safe triangle"**, where damage to internal organs can be avoided
- Local anesthetic is applied.

Intercostal tube drainage

- **INDICATIONS**
  - Unstable pneumothorax
  - Severe dyspnea
  - Lung collapse
  - Open or tension pneumothorax
  - Recurrent pneumothorax
  - If Simple aspiration drainage is unsuccessful in controlling symptoms



Intercostal tube drainage

Fix the catheter and cover with gauze

Pleurodesis and surgery

- **Pleurodesis** is a procedure that permanently eliminates the pleural space and attaches the lung to the chest wall.
- **Thoracotomy** with identification of any source of air leakage is done followed by **pleurectomy** (stripping of the pleural lining)

During the healing process, the lung adheres to the chest wall, effectively obliterating the pleural space.

Complications of Pneumothorax

- Hydropneumothorax.
- Hemopneumotorax

Assignment:

1. Describe the nursing management of a patient with a chest tube drainage.
2. Read and write short notes on:
    - Hemothorax

LUNG CARCINOMA

DEFINITION

- **Lung cancer** is a disease characterized by uncontrolled cell growth in tissues of the lung.

- If left untreated, this growth can spread beyond the lung in a process called **metastasis** into nearby tissue and, eventually, into other parts of the body.

Signs and symptoms:

- Dyspnea (shortness of breath)
- Hemoptysis (coughing up blood)
- Chronic coughing or change in regular coughing pattern
- Wheezing
- Chest pain
- Cachexia (weight loss),
- Fatigue
- Loss of appetite
- Clubbing of the fingernails (uncommon)
- Dysphagia (difficulty swallowing)

Causes and risk factors:

a) Smoking

- Smoking, particularly of cigarettes, is by far the main contributor to lung cancer. Cigarette smoke contains over 60 known **carcinogens.**
- Additionally, nicotine appears to depress the immune response to malignant growths in exposed tissue.
- **Passive smoking**— the inhalation of smoke from another's smoking—may be a cause of lung cancer in nonsmokers.
- 10–15% of lung cancer patients have never smoked.


Smoker's lungs
Non-smoker's lungs

b) Asbestos

- Asbestos can cause a variety of lung diseases, including lung cancer.

c) Viruses

- Recent studies suggest viral carcinogenic potential in humans.
- These viruses may affect the cell cycle and inhibit apoptosis (programmed cell death), allowing uncontrolled cell division.
- Implicated viruses include:
  - human papillomavirus,
  - cytomegalovirus.

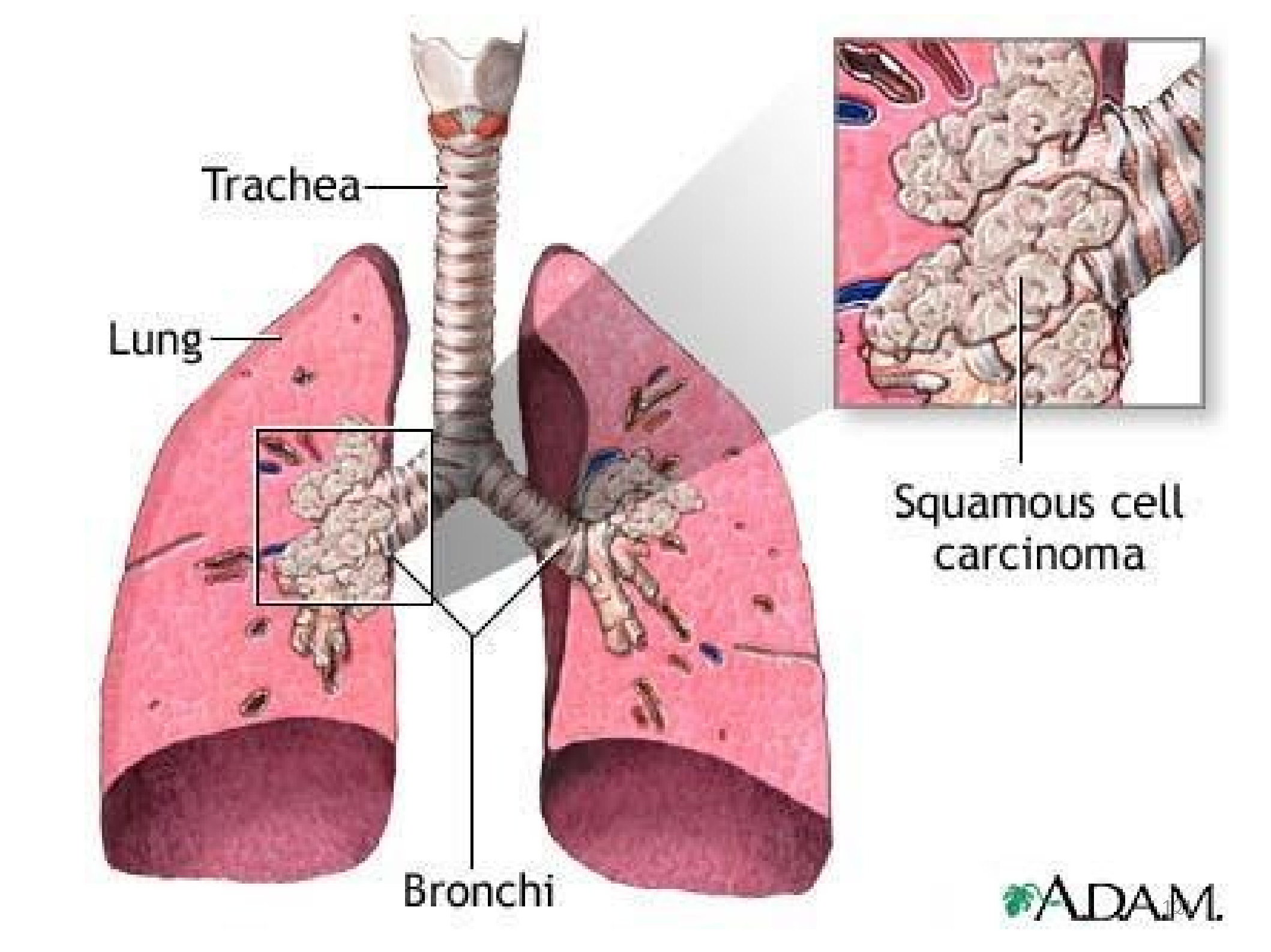
d) Air pollution

- Indoor air pollution – by **radon**
- **Radon** is A radioactive gaseous element formed by the disintegration of radium; the heaviest of the inert gasses.
- Inhalation – causes bronchial deposition of radioactive decay products posing carcinogenic possibilities

Diagnosis:

- Chest Radiograph: Look for- An obvious mass and areas showing atelectasis (collapse)

- If Blood stained sputum is present, but radiograph normal, then:
  - Bronchoscopy
  - CT Scan
  - CT Scan guided biopsy(to find the tumor type)
  - Sputum Cytologic examination


Trachea
Lung
Bronchi
Squamous cell carcinoma
A.D.A.M.

Classification:

- Lung carcinomas classified according to histological types:

i. Small cell carcinoma
ii. Non-small-cell carcinoma:
   - *Squamous cell lung carcinoma*
   - *Adenocarcinoma, and*
   - *Large-cell lung carcinoma.*

Metastasis:

- The lung is a common place for metastasis of tumors from other parts of the body.
- **Secondary cancers** are classified by the site of origin; e.g., breast cancer that has spread to the lung is called *breast cancer*.

Management:

- Surgical
- Non-surgical
  - Radiotherapy
  - Chemotherapy

Radiotherapy:

Radiation therapy works by damaging the DNA of cancerous cells.

Chemotherapy:

- The chemotherapy regimen depends on the tumor type:

i) Small-cell lung carcinoma

– **Cisplatin and Etoposide** are most commonly used.

ii) Non-small-cell lung carcinoma

– Advanced non-small-cell lung carcinoma is often treated with **Cisplatin or Carboplatin**, in combination with **Gemcitabine.**

Surgical Management

- **Lobectomy**: In patients with adequate respiratory reserve this is preferred, as this minimizes the chance of local recurrence.

- **Pneumonectomy** – Surgical removal of a lung (usually to treat lung cancer)

Pneumonectomy specimen containing a squamous cell carcinoma, seen as a white area near the bronchi.

OBSTRUCTIVE RESPIRATORY CONDITIONS

BRONCHITIS

BRONCHITIS

- **Definition**: Bronchitis is an inflammation or swelling of the bronchial tubes (bronchi)

- Individuals with bronchitis breathe less air and oxygen into their lungs; they also have heavy mucus or phlegm (expectorated matter) forming in their airways.

Causes

- Virus (more common)
- In most cases bronchitis is caused by the same virus that cause the common cold or flu (influenza virus)

Pre desposing factors of Bronchitis

- Smoking
- People who are exposed to a lot of second-hand smoke
- People with weakened immune systems
- The elderly and infants
- People with gastroesophageal reflux disease (GERD) – aspiration risks
- People who are exposed to air pollution

***Bronchitis may be ACUTE or CHRONIC

Acute Bronchitis.

- Is characterized by the development of cough
- Acute bronchitis often occurs after a cold or flu, as the result of bacterial infection, or from constant irritation of the bronchi by polluted air or chemical fumes in the environment.

Cont..

- Also characterized by a slight fever that may last for a few days to weeks
- Acute bronchitis, symptoms usually resolve within 7 to 10 days, however, a dry, hacking cough can occur for several weeks.
- Acute bronchitis is more common and often serious in small children because their bronchi are smaller and more easily obstructed and also in the elderly.

Chronic Bronchitis.

- Is a form of chronic obstructive pulmonary disease (COPD) caused by chronic respiratory infections and chronic exposure to environmental pollutants and irritants
- As the condition gets worse, the person becomes increasingly affected by shortness of breath and may require supplemental oxygen.
- It may also include **fever, presence of productive cough that last for 3 months or more per year.**

PATHOPHYSIOLOGY.

- Short term irritation of respiratory tract leads to inflammation resulting in hyper secretion of mucus and initial dry irritating cough which later becomes productive.
- Continued bronchial irritation leads to chronic bronchitis.
- Resulting in hypertrophy and hyperplasia of bronchial mucous glands and mucous producing goblet cells thus causing increased secretion by the bronchial mucosa.

- Chronic infiltration of the bronchial walls by leucocytes and lymphocytes occur making the bronchial wall to become thickened and the bronchial lumen to become narrowed thus interfering with the flow of air to and from the lungs.
- The narrowed lumen often becomes plugged with the mucus. Because of the inflammatory process, the patient has fever with accompanying chills, headache, chest pain and loss of appetite

Signs And Symptoms Of Bronchitis

- Cough.
- Wheezing .
- Throat pain.
- Difficulty in breathing .
- Chest discomfort and soreness.
- Fatigue and headache.
- Fever
- Sweating
- Nausea.

DIAGNOSTIC tests

- History taking.
- Clinical manifestation.
- Physical examination.
- Chest x-ray (Reveal bronchoconstriction, hyperinflation and rounded diagram).
- Sputum culture reveals microorganisms
- Arterial blood gas analysis reveals Respiratory alkalosis.

General Management & Treatment

- Bed rest,
- drink copious fluids,
- breathe warm and moist air
- cough suppressants
- pain relievers

- Many cases of acute bronchitis may go away without any specific treatment, but there is no cure for chronic bronchitis.
- Antibiotics may be prescribed so as to prevent secondary infections

- Cough medications may be administered but we should not suppress the cough completely because its usually important to bring up mucus and remove irritants from the lungs.
- Bronchodilator and Mucolytics help open bronchial tubes, thin and clear out mucus.

BRONCHIOLITIS

Bronchiolitis

- Is inflammation of the fine bronchioles and small bronchi.

Causes

- Viruses, such as
  - Adenowirus,
  - Parainfluenza virus
  - Respiratory syncytial virus(RSV)

Clinical features

- Increased respiratory rate
- Mild fever
- Leukocytosis
- Atelectasis
- Tachycardia
- Exhaustion

Management

- Antipyretics
- Adequate hydration
- Hospitalization in sewere distress
- Humidified oxygen
- Nebulized bronchodilators, epinephrine, and anti-inflammatory medications
- Assisted ventilation
- Nutritional support

Chronic obstructive pulmonary diseases (COPD)

Chronic obstructive pulmonary diseases

- Chronic obstructive pulmonary disease (COPD) refers to **chronic bronchitis** and **emphysema**, a pair of two commonly co- existing diseases of the lungs in which the airways become narrowed.

- This leads to a limitation of the flow of air to and from the lungs causing shortness of breath.

In COPD, less air flows in and out of the airways because of one or more of the following:

- The airways and air sacs lose their elastic quality.
- The walls between many of the air sacs are destroyed.
- The walls of the airways become thick and inflamed.
- The airways make more mucus than usual, which tends to clog them.

COPD Refers to both:

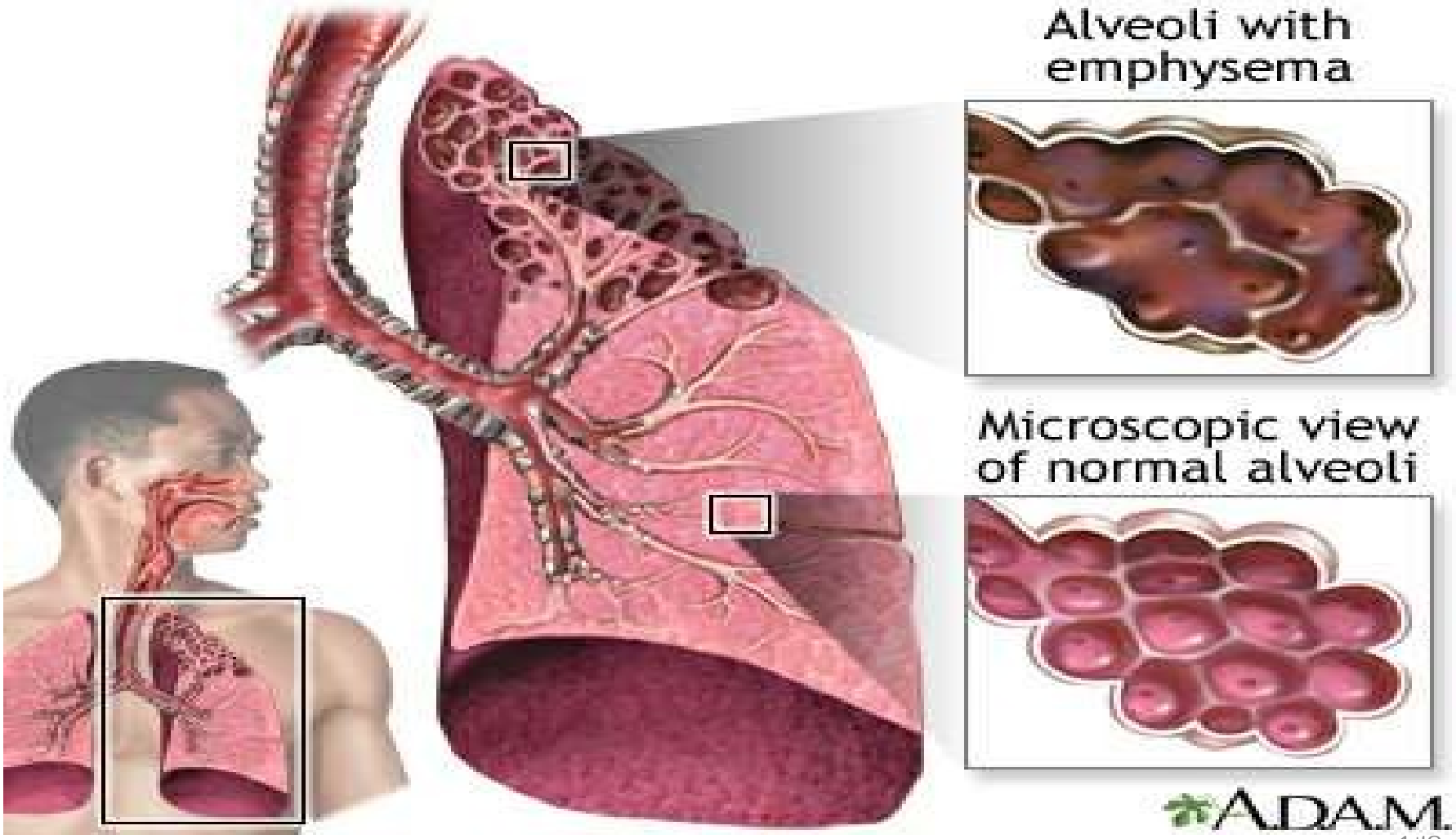
1. Chronic bronchitis (discussed earlier)
2. Emphysema

EMPHYSEMA

Definition:-

- **Emphysema** is defined as enlargement with destruction of the walls of the alveoli.
- As the alveoli are destroyed the alveolar surface area in contact with the capillaries decreases reducing gaseous exchange leading to hypoxia.

In later stages: CO2 elimination is disturbed and increase in CO2 tension in arterial blood causing respiratory acidosis



DIAGNOSIS

- **Blood Test** - Blood tests can help determine if symptoms are being caused by an infection.
- **An arterial blood gas** test will measure the amount of oxygen in blood.
- **Chest X-ray or CT scan**
- **Sputum Examination** - especially if the client has a productive cough. Analyzing sputum can help identify the cause of breathing difficulties
- **ECG** - to determine if your shortness of breath is being caused by a heart condition.

- **Pulmonary Function Test** - measure how well the lungs are moving air in and out. They also measure how well the lungs are moving oxygen to the blood.

MEDICAL MANAGEMENT

The treatment goal for the client with COPD are:

- To improve ventilation
- To facilitate the removal of bronchial secretions
- To promote health maintenance
- To reduce complications, and
- To slow progression of the disease

- **Smoking cessation** - Cessation of cigarette smoking is single most effective and cost effective intervention to reduce the risk of developing COPD and stop the progression of the disease.
- **Bronchodilator drug therapy** dilate the air passages by relaxing the bronchial smooth muscle and improve the ventilation of lungs. They are usually administered via inhalation route but in rare occasions may be given orally or administered intravenously.
- **Oxygen therapy**

Surgical management

- **Bullectomy** - Bullae are enlarged airspaces that do not contribute to ventillation but occupy space in the thorax,these areas may be surgically excised

- **Lung volume reduction surgery** - It involves the removal of a portion of the diseased lung parenchyma.this allows the functional tissue to expand.

- **Lung transplantation**

Nursing management

Nursing diagnosis - Impaired gas exchange related to decreased ventilation

Objectives - Improve ventilation

Intervention

a. Monitor lung sounds every 4 to 8 hours.
b. Perform chest physiotherapy
c. Advice the client to drink at least 8 to 10 glasses of fluid per day unless contraindicated
d. Teach the client about coughing technique
e. Asses the condition of oral mucus membrane and perform oral care

Nursing diagnosis

Disturbed sleep pattern related to dyspnea

Objectives

Getting adequate rest

Intervention

- Promote relaxation by providing a darkened, quiet environment, ensure adequate room ventilation.
- Schedule care activities to allow periods of uninterrupted sleep.

Nursing diagnosis - Anxiety related to acute breathing difficulties and fear of suffocation

Objectives - Relieve fear of dying

Intervention

- Provide a quiet, calm environment.
- During acute episodes, open doors and curtains and limit the number of people in the room.
- Encourage the use of breathing relaxation technique
- Nonpharmacological methods of anxiety reduction are more useful

Nursing diagnosis - Ineffective airway clearance related to excessive secretions and ineffective coughing

Objective - Effective airway clearance

Intervention

- Monitor lung sounds every 4 to 8 hours.
- Perform chest physiotherapy
- Advice the client to drink at least 8 to 10 glasses of fluid per day unless contraindicated
- Teach the client in coughing technique
- Asses the condition of oral mucus membrane and perform oral care

Complications

- More frequent lung infections, such as pneumonia.
- Heart failure affecting the right side of the heart
- A collapsed lung (pneumothorax).
- Sleep problems.

BRONCHIECTASIS

Definition: **Bronchiectasis** is a chronic, irreversible dilation of the bronchi and bronchioles.

Involves Irreversible bronchial dilatation

Causes

- Airway obstruction
- Diffuse airway injury
- Pulmonary infections and obstruction of the bronchus
- Genetic disorders such as cystic fibrosis
- Abnormal host defense (eg immunodeficiency)
- Idiopathic causes

Clinical features

- Chronic cough with mucopurulent sputum
- Wheezing or stridor.
- Cyanosis
- Easy fatigability
- Retarded physical growth
- Chest enlargement from over-inflation of alveoli caused by the air trapped behind inflamed bronchi.
- Clubbing of the fingers also is common because of respiratory insufficiency

Pathophysiology

- The inflammatory process associated with pulmonary infections damages the bronchial wall, causing a loss of its supporting structure and resulting in thick sputum that ultimately obstructs the bronchi. The walls become permanently distended and distorted, impairing mucociliary clearance.
- The inflammation and infection may extend to the peribronchial tissues; each dilated tube virtually amounting to a lung abscess. The exudate of which drains freely through the bronchus.

- Bronchiectasis is usually localized, affecting a segment or lobe of a lung, most frequently the lower lobes.
- The retention of secretions and subsequent obstruction ultimately cause the alveoli distal to the obstruction to collapse (atelectasis).
- Inflammatory scarring or fibrosis replaces functioning lung tissue. In time the patient develops respiratory insufficiency with reduced vital capacity and decreased ventilation leading to hypoxemia.

Investigations

- Full blood count
- Sputum exam
- Ct scan

General Management

- Early and effective management reduces short- and long-term morbidity
- Airway clearance – Example: by chest physio.
- Nutrition
- Avoid environmental pollutants e.g Tobacco
- Assessment for co-morbidities (other respiratory disorders)
- Intensive antibiotic treatments to Reduce microbial load

- Inhaled mucolytic agents or bronchodilators
- Chest physiotherapy-to raise the tenacious sputum.
- Treat the cause

- **Smoking cessation** is important because smoking impairs bronchial drainage by paralyzing ciliary action, increasing bronchial secretions, and causing inflammation of the mucous membranes

Nursing Management

- Nursing management of the patient with bronchiectasis focuses on alleviating symptoms and assisting the patient to clear pulmonary secretions.
- Smoking and other factors that increase the production of mucus and hamper its removal are targeted in patient teaching.
- The patient and family are taught to perform postural drainage and to avoid exposure to others with upper respiratory and other infections.

- If the patient experiences fatigue and dyspnea, strategies to conserve energy while maintaining a lifestyle as active as possible are discussed.
- The patient needs to become knowledgeable about early signs of respiratory infection and the progression of the disorder so that appropriate treatment can be implemented promptly.
- The patient's nutritional status is assessed and strategies are implemented to ensure an adequate diet.

BRONCHIAL ASTHMA

Introduction

Asthma is a chronic inflammatory disorder of the airways that is characterized:

- ***clinically*** by recurrent episodes of wheezing, breathlessness, chest tightness, and cough, particularly at night/early morning.
- ***physiologically*** by widespread, reversible narrowing of the bronchial airways and a marked increase in bronchial responsiveness.

Classification

Atopic /extrinsic /allergic asthma(~70%)

- IgE mediated immune responses to environmental antigens.

Non-atopic/ intrinsic /non-allergic asthma(~30%)

- Triggered by non immune stimuli.
- Patients have negative skin test to common inhalant allergens and normal serum concentrations of IgE.
- Asthma may be triggered by aspirin, pulmonary infections, cold, exercise, psychological stress or inhaled irritants.

Pathophysiology

- Mast cells in response to allergens release histamine and leukotrienes that result in diffuse obstructive and restrictive airway due to:

✓ **Chronic inflammation,**

✓ **Airway hyperresponsiveness**

- Bronchoconstriction
- Increased mucus production.

1. Inflammation

Chronic inflammatory state

- Involves respiratory mucosa from trachea to terminal bronchioles, predominantly in the bronchi.
- Activation of mast cell, infiltration of eosinophils & T-helper lymphocytes occur.
- Many different inflammatory mediators are involved.

Inflammation...

- Exact cause of airway inflammation is thought to be an interplay between endogenous and environmental factors.

Endogenous factors –

- **Genetics**
- **Atopy (allergy)–**

  - The major risk factor for asthma

  - Asthma is commonly associated with other atopic diseases – allergic rhinitis(80%), atopic dermatitis, urticaria, etc.

Inflammation...

Environmental factors

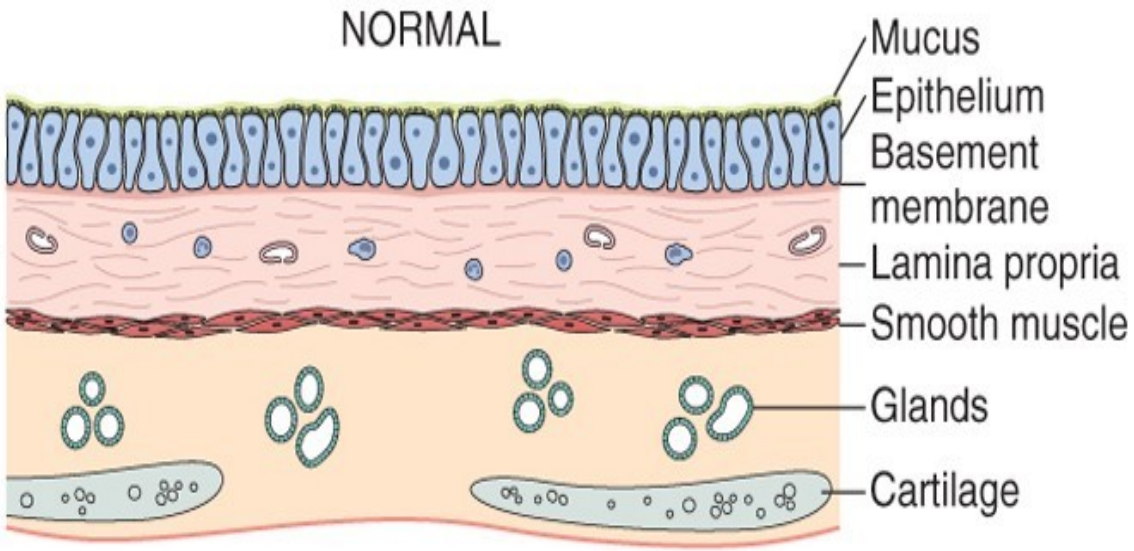
- **Viral infections** – Respiratory syncytial virus (RSV), Mycoplasma, Chlamydia
- **Air pollution**
- **Allergens** – house dust

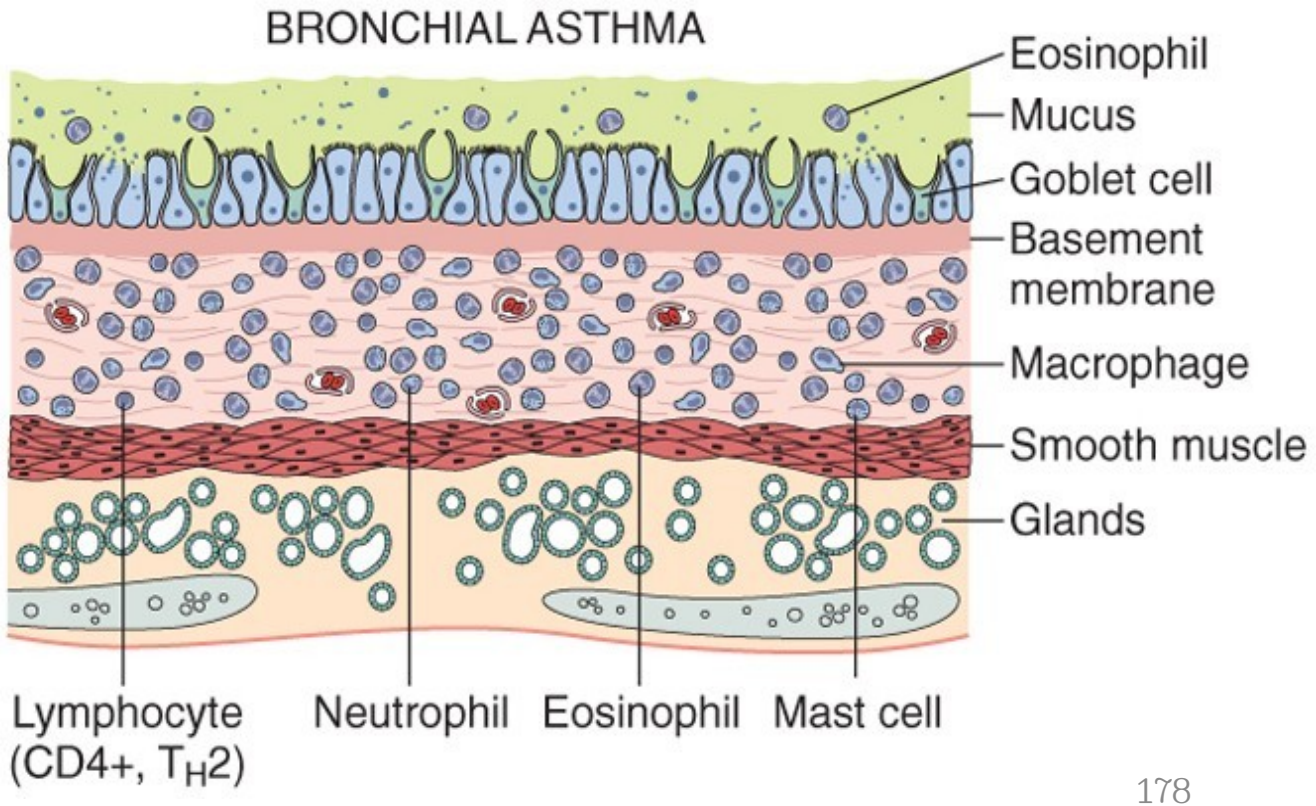
2. Airway Hyperresponsiveness (AHR)

- An excessive bronchoconstrictor response to multiple inhaled triggers occurs.
- Is a characteristic physiologic abnormality of asthma.

Asthma Triggers

- Allergens
- Viral Infections
- Drugs
- Exercise
- Air pollutants
- GERD
- Stress
- Occupational factors


NORMAL
Mucus
Epithelium
Basement membrane
Lamina propria
Smooth muscle
Glands
Cartilage


BRONCHIAL ASTHMA
Eosinophil
Mucus
Goblet cell
Basement membrane
Macrophage
Smooth muscle
Glands
Lymphocyte (CD4+, T_H2)
Neutrophil
Eosinophil
Mast cell

Clinical presentation

- Wheezing, dyspnea and cough.
- Tenaceous mucus production.
- Symptoms worse at night.
- Nonproductive cough
- Limitation of activity
- ij respiratory rate,with use of accessory muscles
- Hyper-resonance on percussion
- Expiratory rhonchi
- No findings when asthma is under control or Between attacks

Investigations

- **Pulmonary function tests:** Spirometry
- **CXR** – hyperinflation, pneumothorax, emphysema
- **Skin hypersensitivity test**
- **Sputum & blood exam: show eosinophilia**
- **Elevated serum IgE levels**

Drug treatment (Classification of drugs)

Bronchodilators – rapid relief, by relaxation of airway smooth muscle

- ✓ Beta 2 Agonists: Albuterol /salbutamol
- ✓ Anticholinergic Agents: ipratropium
- ✓ Methylxanthines

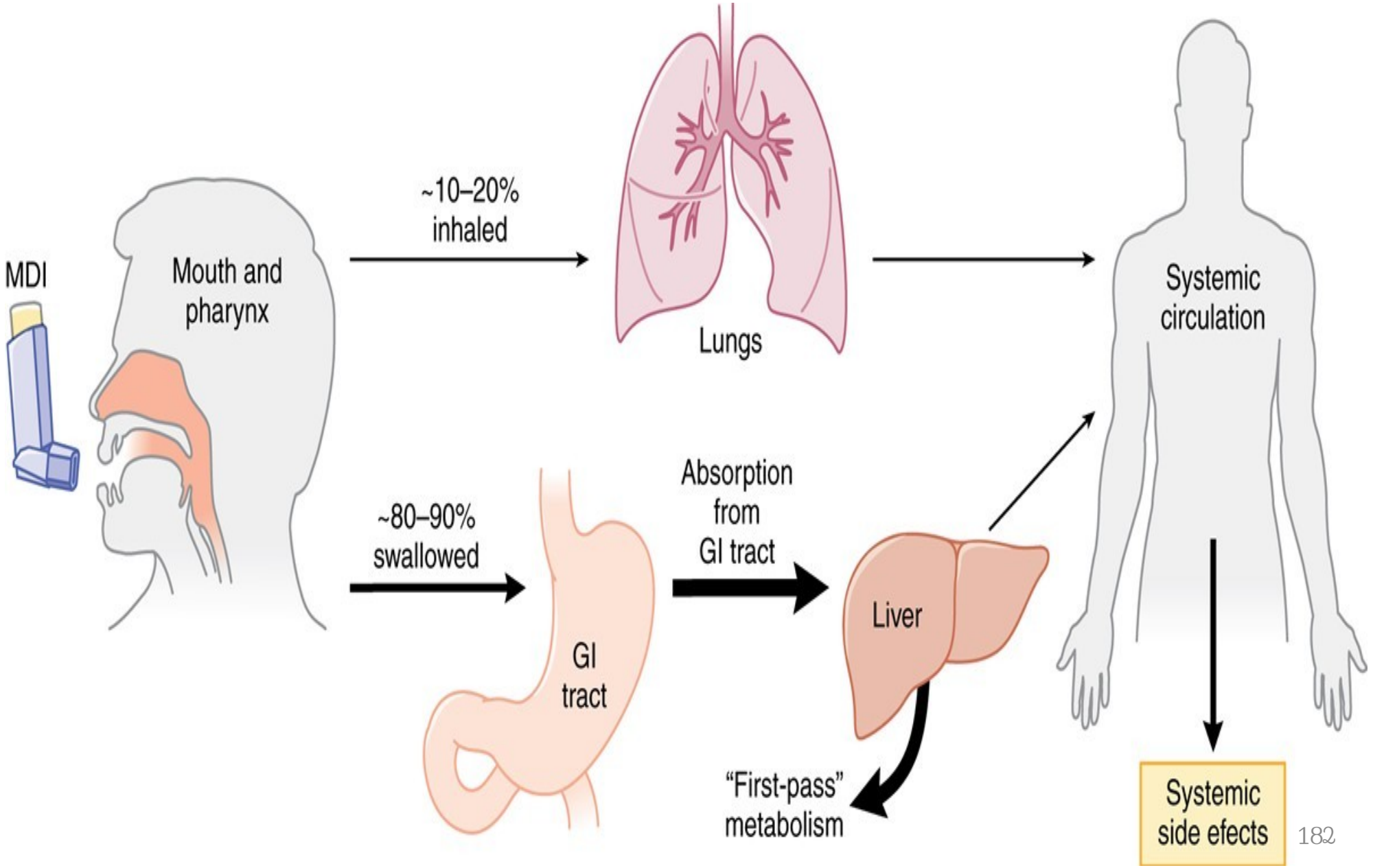
Inhibitors of the inflammatory process

- ✓ Glucocorticoids

Cromones: e.g. cromolyn sodium

Anti-IgE therapy: e.g omalizumab

Disposition of inhaled drugs (from Metered dose inhalers)



STATUS ASTHMATICUS

Status Asthmaticus (Severe Acute Asthma)

Definition: A prolonged and severe asthma attack that does not respond to standard treatment

- Severe airway obstuction
- Severe dyspnoea & unproductive cough
- Patients use accessory muscles of respiration
- Additionally, patients have Sweating, central

Treatment of Status asthmaticus

- High conc. of oxygen through facemask
- Nebulised salbutamol(5mg) in oxygen given immediately
- Ipratopium bromide(0.5mg) + salbutamol(5mg) nebulised in oxygen, for those who don't respond within 15-30 min

- Terbutaline Subcutaneously.(0.25-0.5mg) or i.v. If there is excessive coughing or too weak to inspire adequately.

- Hydrocortisone100mg i.v. stat, followed by 100-200mg 4-8 hrly infusion.

- Endotracheal intubation & mechanical ventilation if all the above treatments fails

REFERENCES

1. Grant A; Waugh A; (2014); Ross and Wilson **Anatomy and Physiology in Health and Illness;** Ed. 12 © Churchill Livingstone.

2. Hinkle J L and Cheever K H (2014) ***Brunner & Suddarth's Textbook of Medical–Surgical Nursing;*** Ed.13; © Lippincott Williams & Wilkins.

THANK YOU