

PNEUMOTHORAX

An anatomical illustration of the human respiratory system. The lungs are shown in a reddish-orange color, with a network of bronchi and blood vessels. The trachea is visible in the center. The background is a blue-tinted human torso, showing the ribcage and shoulders.

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Ground rules

Silence Please



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INTRODUCTION

- Pneumothorax refers to the presence of air in the pleural space.
- It may occur spontaneously or due to trauma (Iatrogenic) to the lungs or the chest wall.
- Spontaneous pneumothorax occurs due to the rupture of pleural blebs.
- Iatrogenic injury occurs while performing any thoracic, cardiac or any chest wall surgeries.
- Trauma may be due to gunshot injuries, stab injuries, blunt trauma over the chest wall etc.

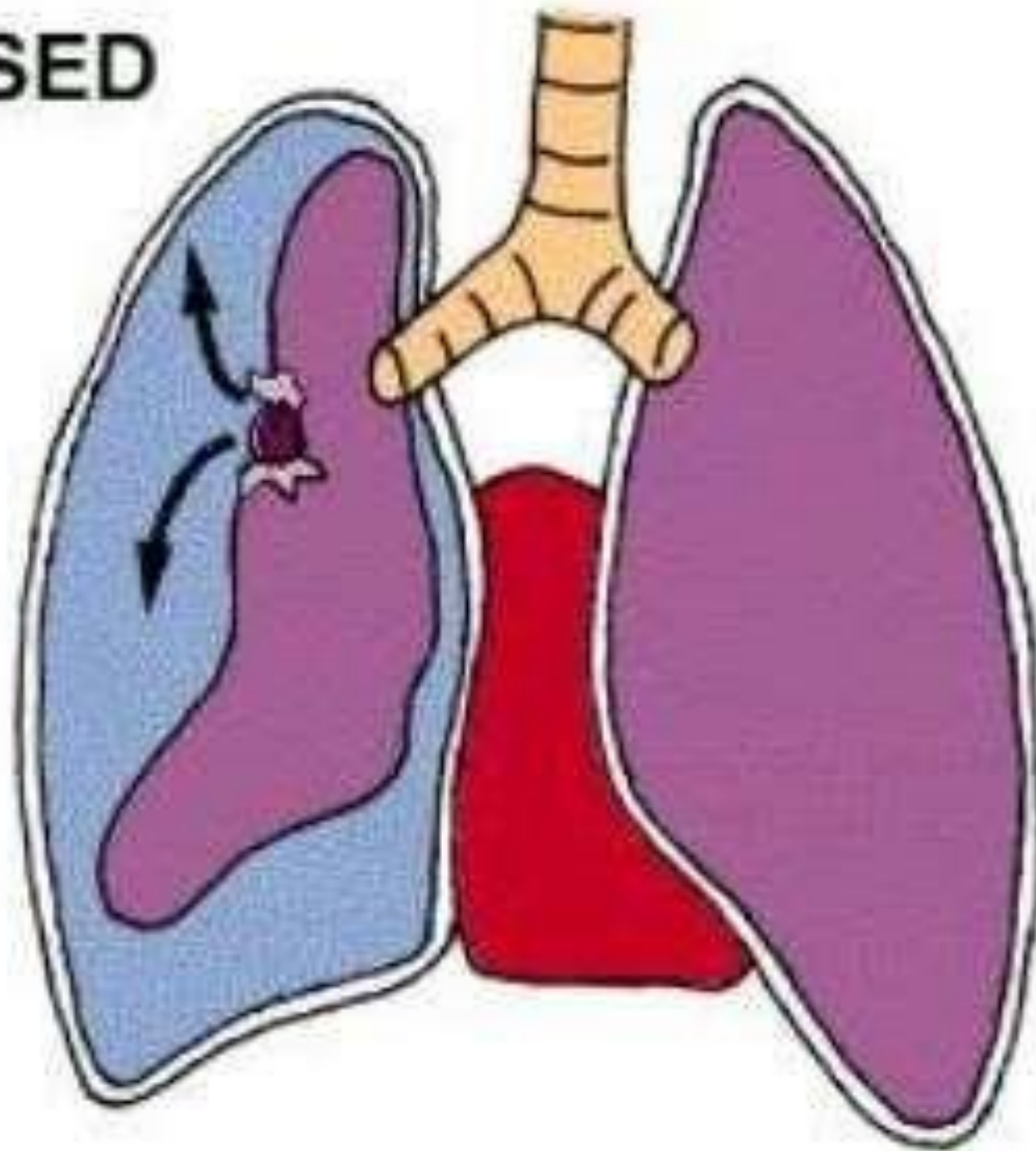
PATHOLOGY

★ **Simple / Closed pneumothorax :-**

1. The opening in the lung is very small and hence, it heals rapidly.
2. There is no continuous communication between the lung and the pleural cavity.
3. The mean pleural pressure is less than the atmospheric pressure.

Closed Pneumothorax

CLOSED

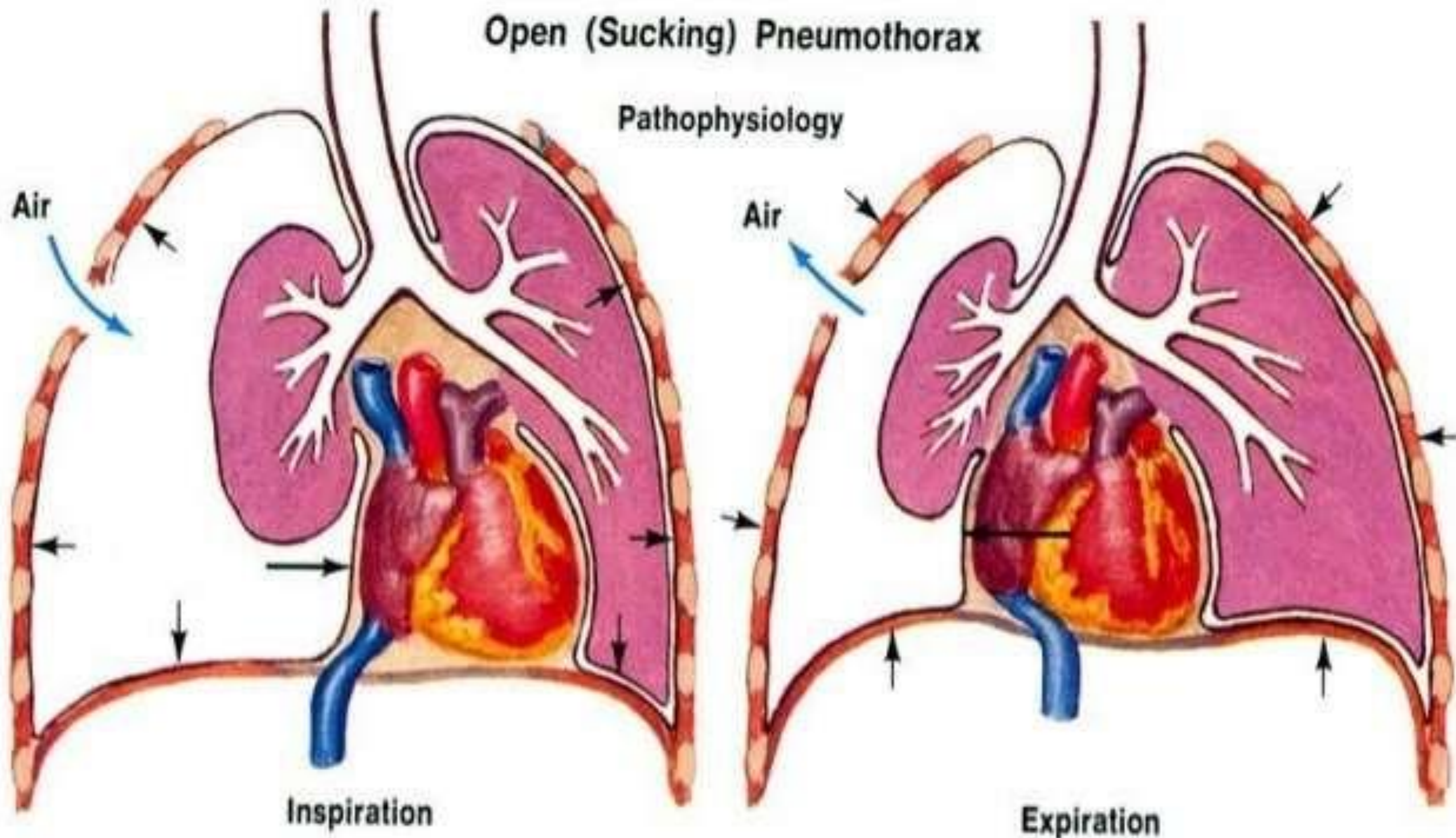


★ Open / Sucking pneumothorax :-

1. The ruptured site remains open and There is a communication between the pleural cavity and the bronchus forming the Broncho-pleural fistula.
2. Pleural pressure is equal to the atmospheric pressure
3. Due to broncho-pleural fistula, infection in the pleural space is common and hence leads to pyopneumothorax.

Open (Sucking) Pneumothorax

Pathophysiology



Air enters pleural cavity through open, sucking chest wound. Negative pleural pressure is lost, permitting collapse of ipsilateral lung and reducing venous return to heart. Mediastinum shifts, compressing opposite lung

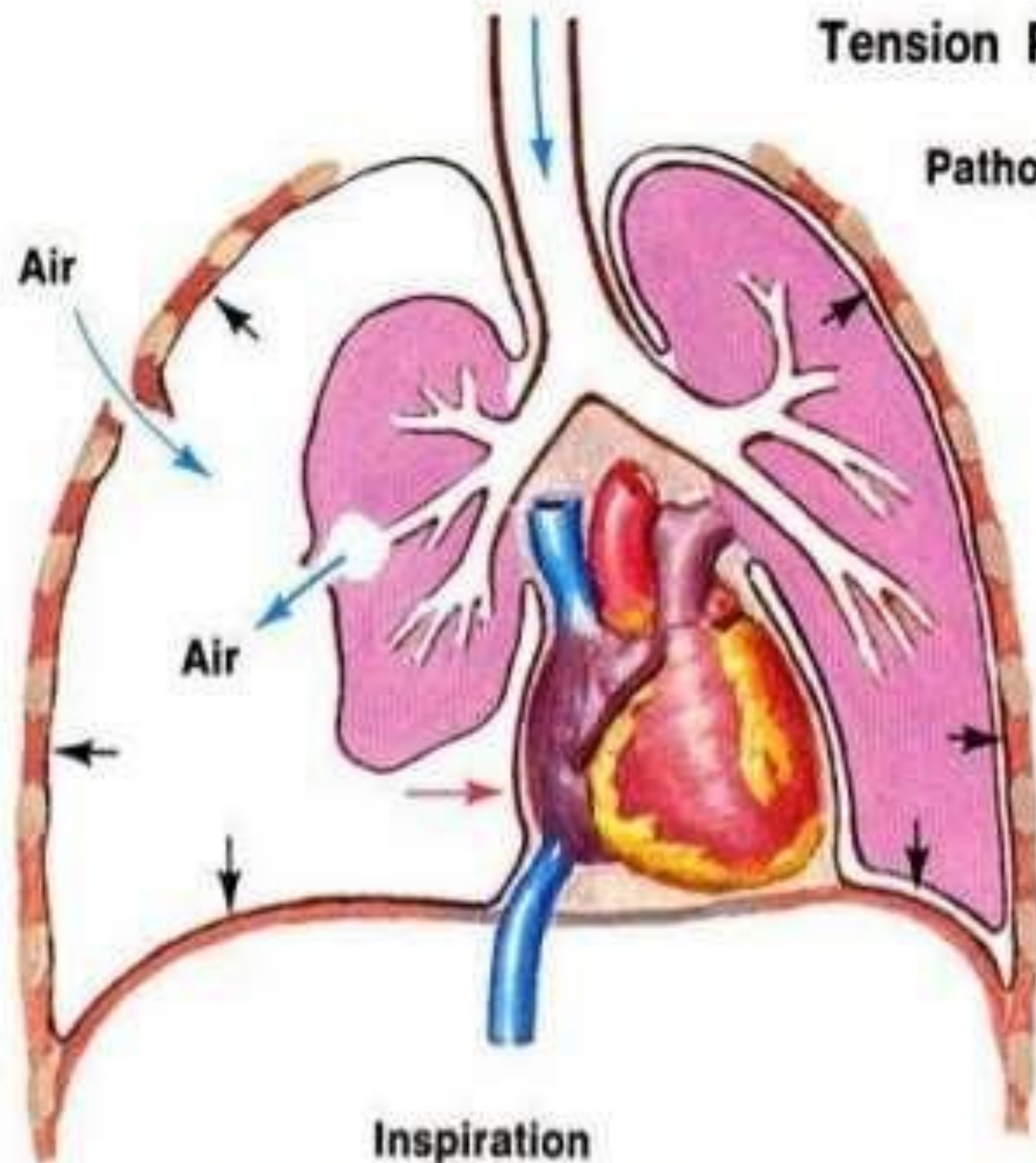
As chest wall contracts and diaphragm rises, air is expelled from pleural cavity via wound. Mediastinum shifts to affected side and mediastinal flutter further impairs venous return by distortion of venae cavae

★ **Tension pneumothorax** :-

1. The communication between the lung and pleural cavity is small and is valvular.
2. It allows air entry during inspiration but prevents it from escaping during expiration.
3. Therefore, pleural pressure is more than the atmospheric pressure.

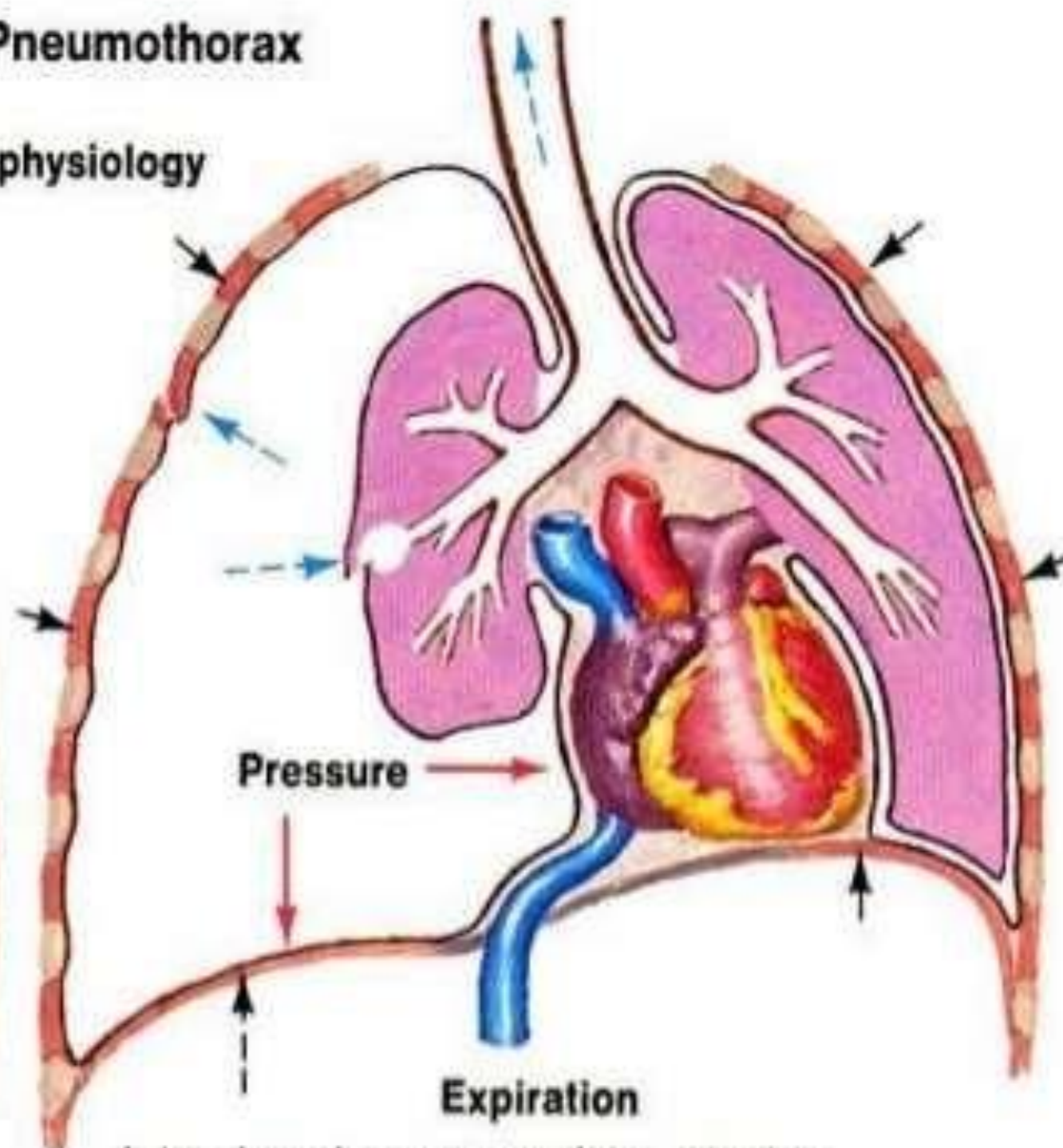
Tension Pneumothorax

Pathophysiology



Inspiration

Air enters pleural cavity through lung wound or ruptured bleb (or occasionally via penetrating chest wound) with valvelike opening. Ipsilateral lung collapses and mediastinum shifts to opposite side, compressing contralateral lung and impairing its ventilating capacity



Expiration

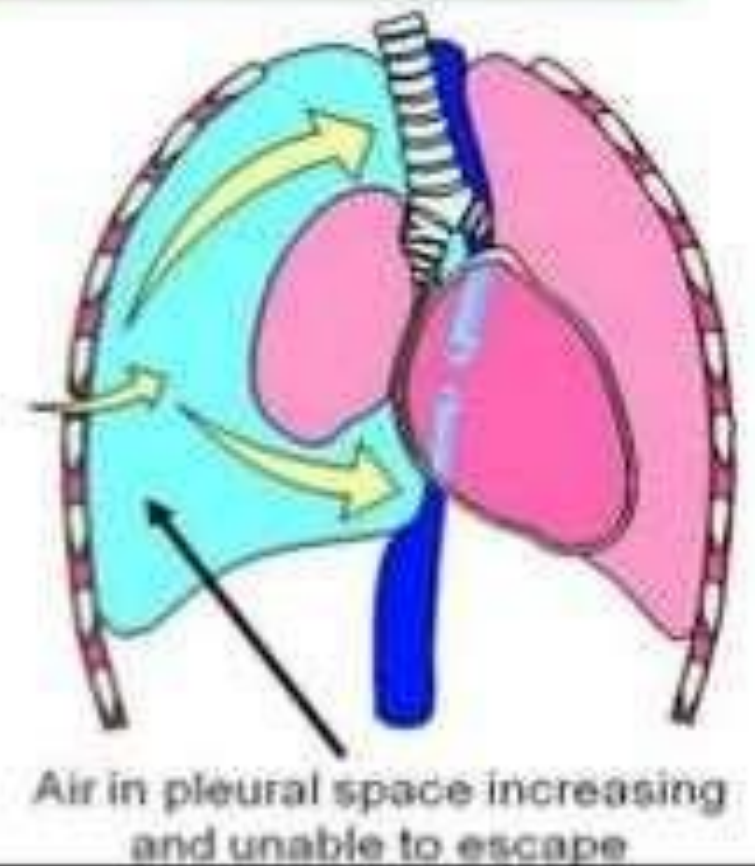
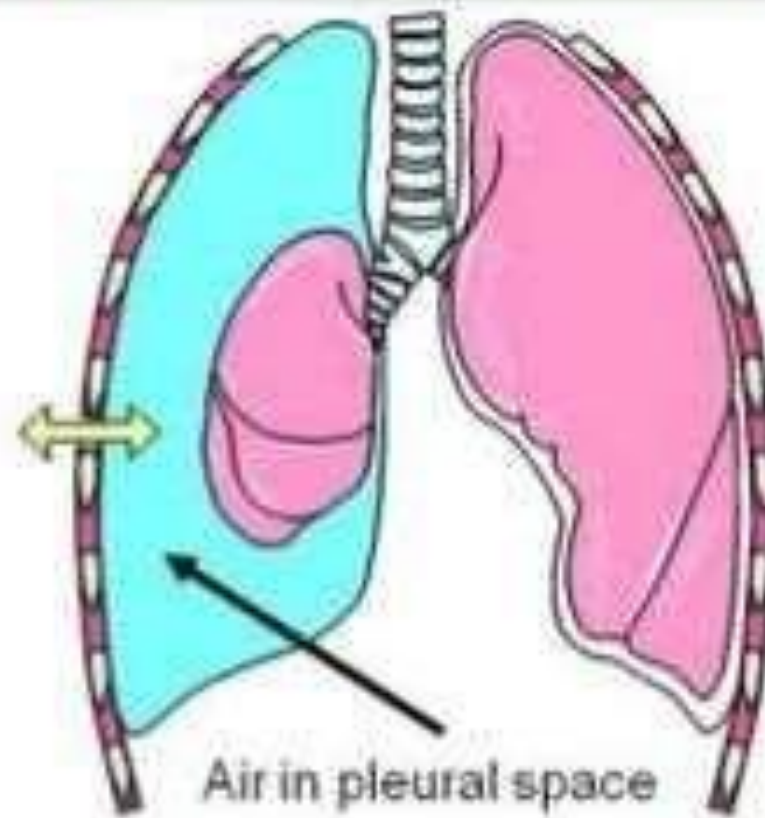
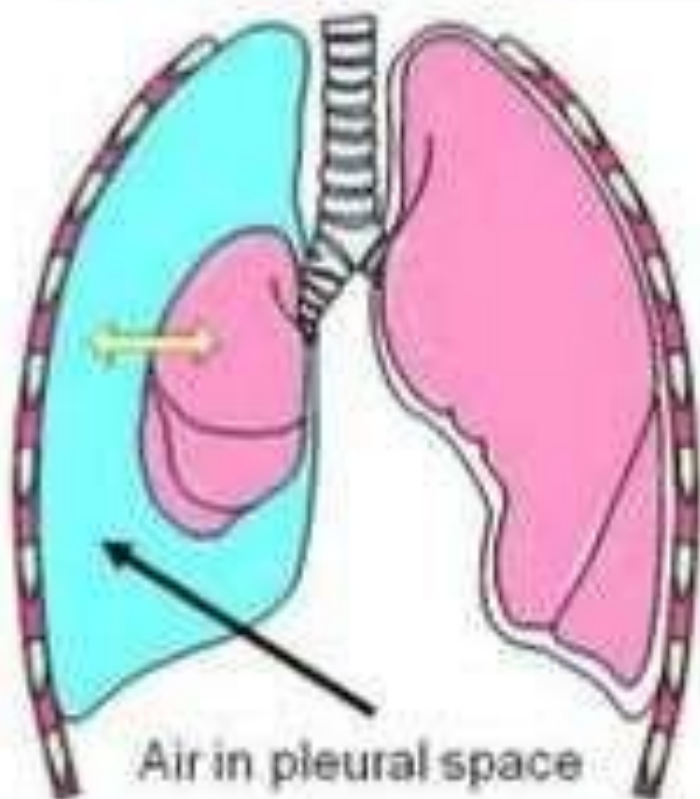
Intrapleural pressure rises, closing valvelike opening, thus preventing escape of pleural air. Pressure is thus progressively increased with each breath. Mediastinal and tracheal shifts are augmented, diaphragm is depressed, and venous return is impaired by increased pressure and vena caval distortion

Pneumothorax

Closed pneumothorax

Open pneumothorax

Tension pneumothorax



The pleural cavity pressure is $<$ the atmospheric pressure

The pleural cavity pressure is $=$ the atmospheric pressure

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CLINICAL FEATURES

★ **Closed pneumothorax :-**

- Reduced chest expansion.
- Hyper-resonant note on percussion.
- Reduced air entry.
- Mediastinal shift to opposite side.
- Decreased Tactile Vocal Fremitus (TVF).
- Decreased Vocal Resonance.

★ **Open pneumothorax :-**

- Crackpot sound on percussion.
- Amphoric breath sounds.
- Voice and cough sounds may be heard with metallic echo.

★ **Tension pneumothorax** :-

- Displacement of the mediastinum with respiration.
- Dyspnoea.
- Cyanosis.
- Tachycardia.
- Increased respiratory rate.
- Decreased blood pressure.
- Respiratory failure.

RADIOLOGICAL FINDINGS

★ **Chest X-ray** :-

- Hyper translucency between the lung & thoracic cage.
- Razor sharp border of the collapsed lung.
- Shifting of mediastinum on the opposite side of injury.

★ **Chest CT scan** :-

- Intrapleural gas along with loculated pneumothoraces.
- Pleural effusion, pneumothorax.

★ **Chest Ultrasound** :-

- Smooth horizontal echogenic lines are seen above and below the pleural lines.
- Absence of lung sliding and B - lines.
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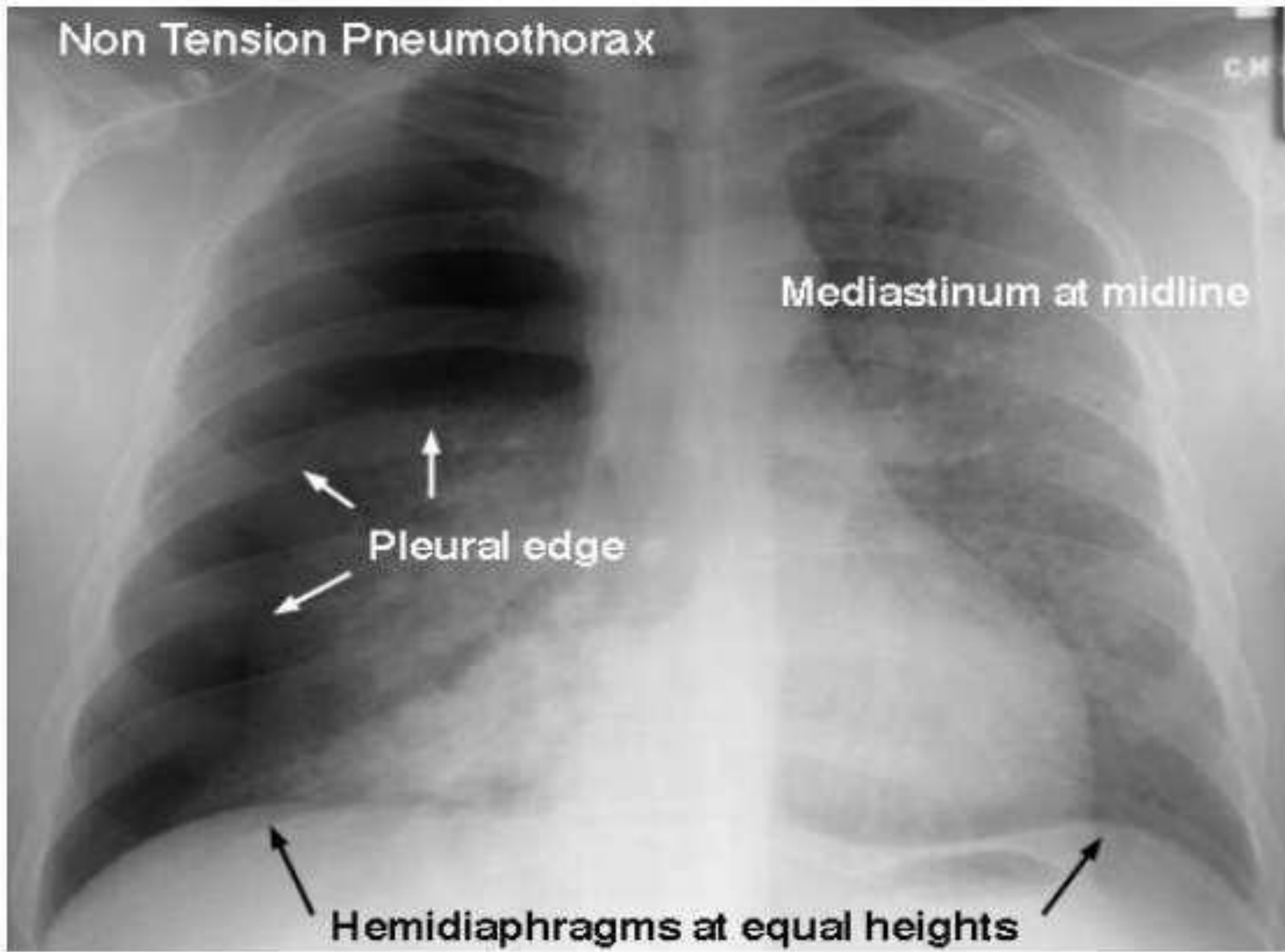
Non Tension Pneumothorax

C.M.

Mediastinum at midline

Pleural edge

Hemidiaphragms at equal heights

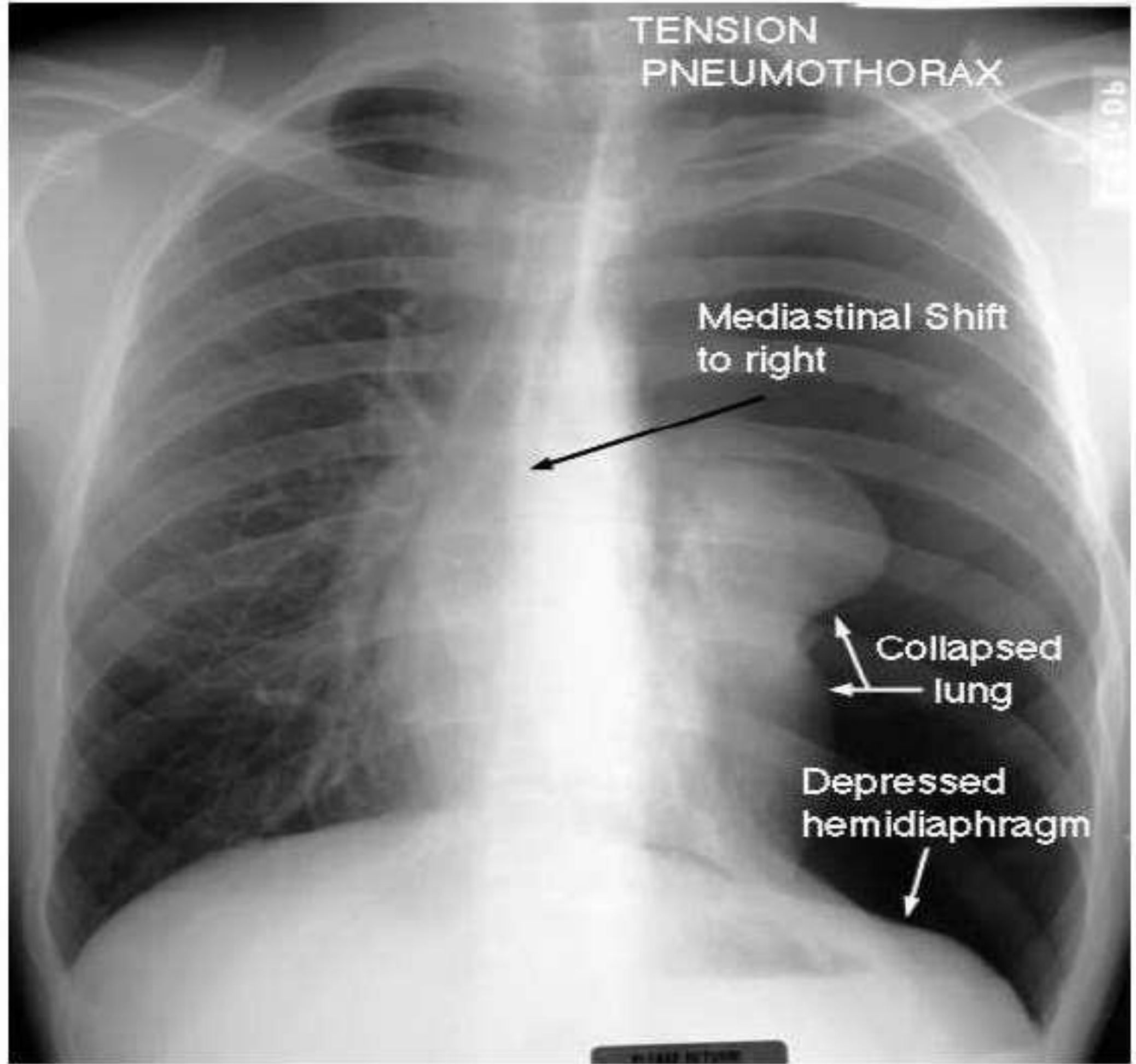


TENSION
PNEUMOTHORAX

Mediastinal Shift
to right

Collapsed
lung

Depressed
hemidiaphragm



SURGICAL MANAGEMENT

- **Supplemental oxygen** :- It is administered to facilitate resorption of pleural air.
- **Aspiration** :- It is done during thoracocentesis to aspirate the air in pleural cavity.
- **Tube thoracostomy** :- Chest tube is connected to a water seal device with or without suction and is kept until the pneumothorax resolves.
- **Thoracoscopy** :- Video - Assisted Thoracoscopy (VATS) is done to perform mechanical pleurodesis.

PHYSIOTHERAPY MANAGEMENT

★ Goals :-

1. To improve distribution of ventilation.
2. To reinflate atelactatic lung areas.
3. To increase oxygenation.
4. To improve exercise tolerance.
5. Maintain airway clearance.

SMALL PNEUMOTHORAX TREATMENT

1. Gentle coughing can be performed and adequate humidification for ease of sputum production.
2. Reduce exercise intensity and avoid upper limb resistance exercises.
3. Monitoring of the vitals throughout the exercise session is an essential measure.

LARGE PNEUMOTHORAX TREATMENT

1. Adequate humidification will assist the clearance of secretions.
2. Shoulder ROM exercises are performed but resistance exercises are must be avoided.
3. Aerobic exercises should be started like walking, gentle cycling etc.
4. Avoid positive pressure therapy while draining as well as after 1 - 2 weeks to avoid pleural fistula and the risk of recurrence.

RECURRENCE PREVENTION

1. Pleurodesis via VATS or chemical pleurodesis via tube thoracotomy.
2. Thoracotomy is recommended when thoracoscopy is unavailable or has failed.
3. Smoking cessation may help to prevent recurrent pneumothoraces.

PRESENTATION FINISHED

ANY QUESTIONS...

Thank
you