

## Pneumothorax

### Anatomy & Physiology

Main job of the lung is PaO<sub>2</sub> and CO<sub>2</sub> exchange.

Done through "bellows action"

Pleural Cavity

Friction free is assisted by surfactant

Visceral pleura- membrane that lines the lungs

Parietal pleura-membrane lines the chest cavity

Normal pressure in the intrathoracic space is negative. (-4 to -6cm/H<sub>2</sub>O)

In normal respiration the pleural space is lessened as the lungs expand, decreasing the intrathoracic pressure to about -7cm/H<sub>2</sub>O.

At the end of inspiration alveolar pressure increases above atmospheric pressure

During expiration the intrathoracic pressure falls and begins to become less negative (-2cm/H<sub>2</sub>O)

Alveolar pressure decreases during expiration

### Chest Trauma Two Types

1. **Blunt-** sudden compression or positive pressure against the chest wall.

#### Pathophysiology

Hypoxemia from disruption of the airway

Hypovolemia from massive fluid loss

Cardiac failure from tamponade, contusion or increased intrathoracic pressure

#### Assessment

When injury happened

Mechanism (how it happened)

Level of responsiveness

Specific injuries

Estimated blood loss (EBL)

ETOH or Drugs

Pre-hospital treatment

#### Medical Management

→ Establish an airway

→ Potential for large blood loss

→ Re-establish chest wall integrity

#### Diagnostics

CXR/CT Scan

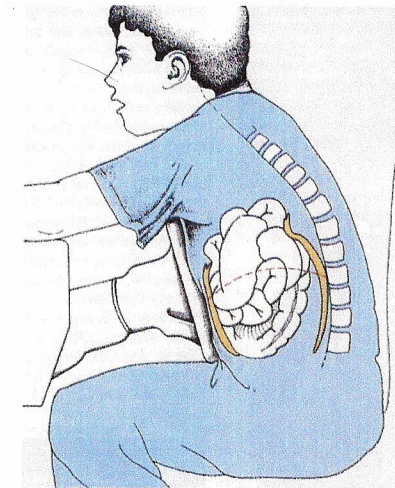
CBC, Coags, Type & Screen, Chem 7

ABG

EKG



## Blunt Trauma



2. **Penetrating-**

a foreign object penetrates the chest wall. ie Gunshot, Stab wounds

#### Management

Establish an airway

Examine patient for other injuries

Undress the patient!

Large bore IV

CXR

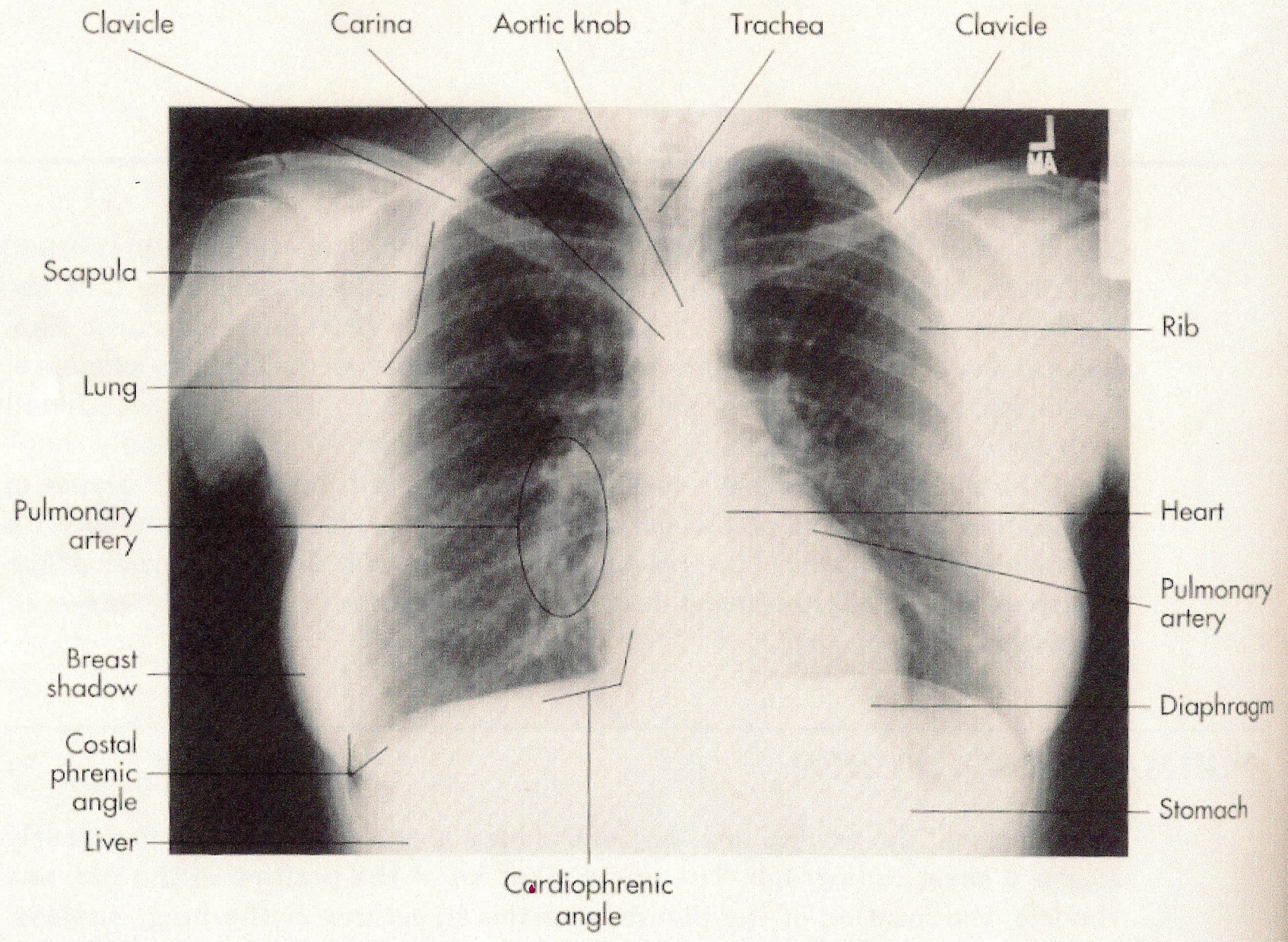
Labs ( CBC, CMP, Type & Screen), ABG

Pulse Ox/EKG

IVF

Chest Tube

CXR of a Normal Patient



**Pneumothorax** Parietal/visceral pleura is breached and the pleural space is exposed to positive atmospheric pressure . **Three types:**

**Simple** (spontaneous, pneumothorax occurs when air enters the pleural space through a breach of either the parietal or visceral pleura. Usually occurs as air enters the pleural space through the rupture of a bleb or a bronchopleural fistula. May occur in seemingly healthy person in the absence of trauma due to rupture of an air-filled bleb on the surface of the lung, allowing air from the airways to enter the pleural cavity. May be associated w/ diffuse interstitial lung disease & severe emphysema.

**Traumatic** - occurs when air escapes from a laceration in the lung itself and enters the pleural space or from a wound in the chest wall. Caused by blunt trauma (eg, rib fractures), penetrating chest or abdominal trauma (eg, stab wounds or gunshot wounds), or diaphragmatic tears. Traumatic pneumothorax may occur during invasive thoracic procedures (ie, thoracentesis, transbronchial lung biopsy, insertion of a subclavian line, or chest sx) in which the pleura is inadvertently punctured, or with barotrauma from mechanical ventilation. often accompanied by hemothorax (collection of blood in the pleural space resulting from torn intercostal vessels, lacerations of the great vessels, or lacerations of the lungs). Often both blood and air are found in the chest cavity (hemopneumothorax) after major trauma.

**Tension** air is drawn into the pleural space from a lacerated lung or a small opening or wound in the chest wall. It may be a complication of other two types . In contrast to open pneumothorax, the air that enters the chest cavity with each inspiration is trapped; it cannot be expelled during expiration through the air passages or the opening in the chest wall. With each breath, tension (positive pressure) is increased within the affected pleural space. This causes the lung to collapse and the heart, the great vessels, and the trachea to shift toward the unaffected side of the chest (mediastinal shift). Both respiration and circulatory function are compromised because of the increased intrathoracic pressure, which decreases venous return to the heart, causing decreased cardiac output and impairment of peripheral circulation. In extreme cases, the pulse may be undetectable, this is known as pulseless electrical activity.

#### Clinical manifestations

Signs and symptoms depend on size and cause

Pain is sudden

#### Management

The goal of treatment is to evacuate the air or blood from the pleural space

#### Nursing management

Chest tube management will be discussed further

Pain control

**Tension Pneumothorax** Occurs when air is drawn into the pleural space from a lacerated lung or through a small hole in the chest wall.

Mediastinal shift

PEA-pulseless electrical activity

#### Clinical Manifestations

Air hunger

Agitation

Hypoxemia

Cyanosis

Hypotension

~~Tachycardia~~

~~Diaphoresis~~

#### Management

High flow oxygen

Needle decompression - done in field until they get pt. to acute care

Chest tube

#### Hemothorax

Collection of blood in the pleural space

Can occur after chest surgery or injury

#### Assessment

Same as pneumothorax, except no hyper-resonance, dullness with percussion

Mediastinal shift may occur

#### Diagnosis

- CXR

- Thoracentesis

#### Cardiac Tamponade (also chest sx or trauma)

Compression of the heart as a result of fluid within the pericardial sac

Causes- blunt/penetrating chest trauma

High mortality from penetrating wound to the heart

#### Subcutaneous Emphysema (also chest sx or trauma)

Air enters the tissue planes and passes under the skin

Crackling sensation "rice krispies" can be felt on chest

Air can be absorbed if treated or spontaneously stops

