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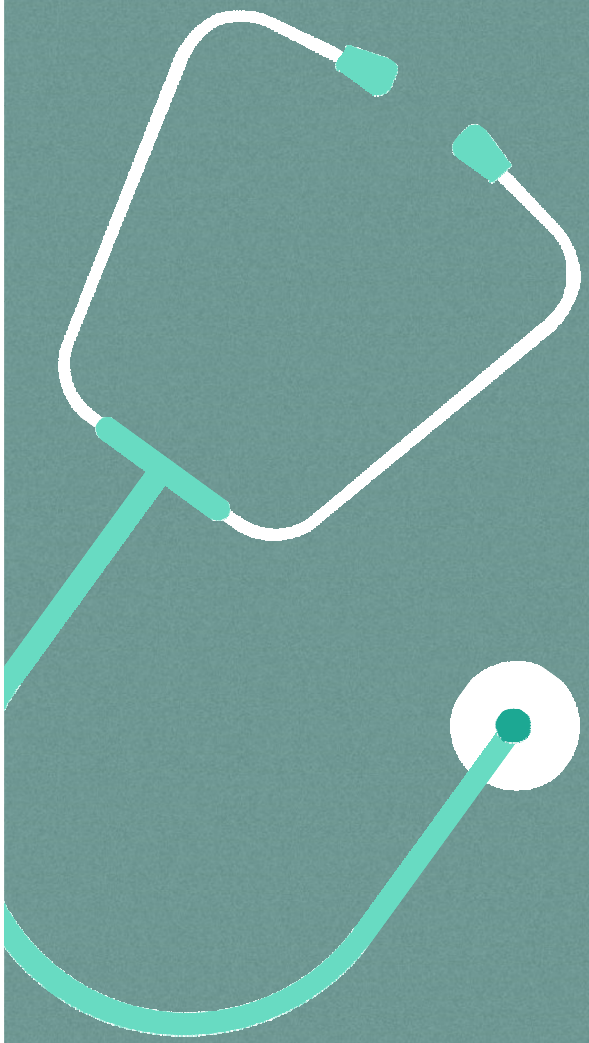

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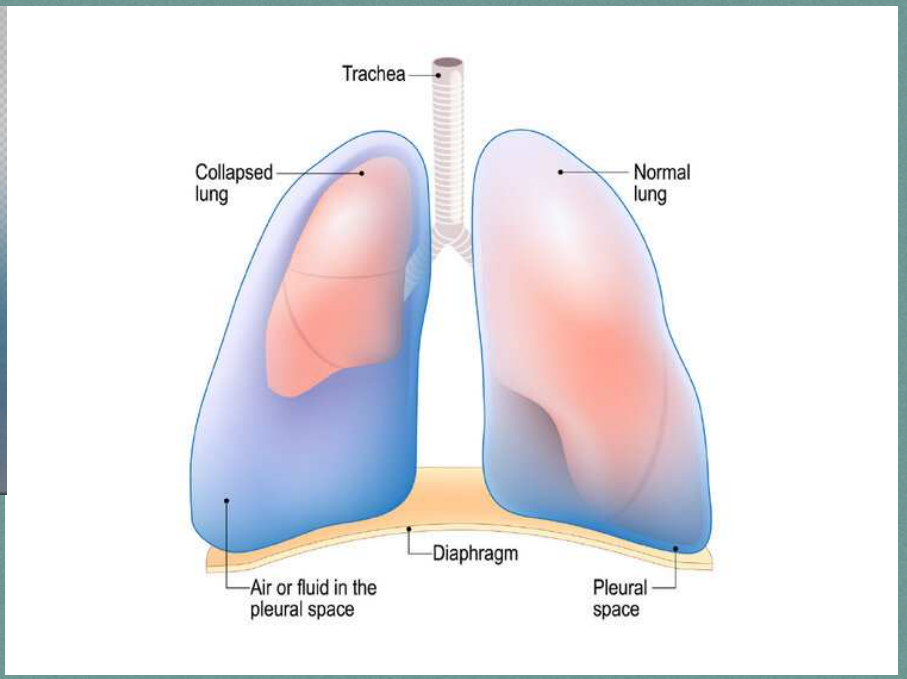
Pneumothorax

Chapter.1

Pneumothorax



Pneumothorax

1. Collection of air in the pleural space, between the lung and the chest wall

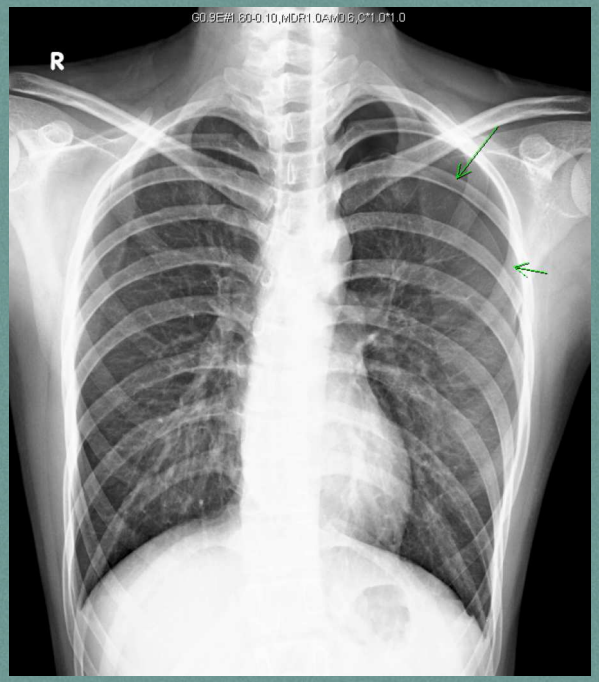
1. Spontaneous / Secondary / Traumatic / Iatrogenic

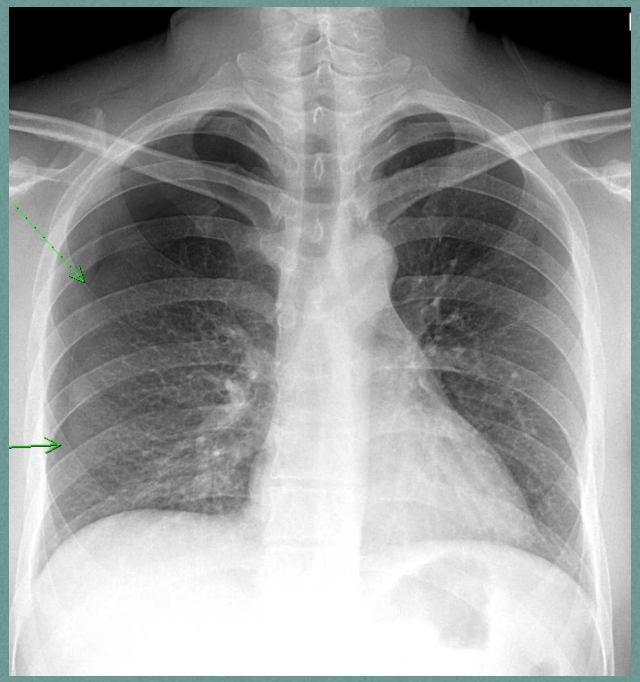
1. Two peaks of incidence
    1) Between 20-30 years: Primary spontaneous PNX (PSP)
    2) Between 60-70 years: Secondary spontaneous PNX (SSP)

Pneumothorax – Primary Spontaneous PNX

Most common cause: Rupture of small sub-pleural blebs

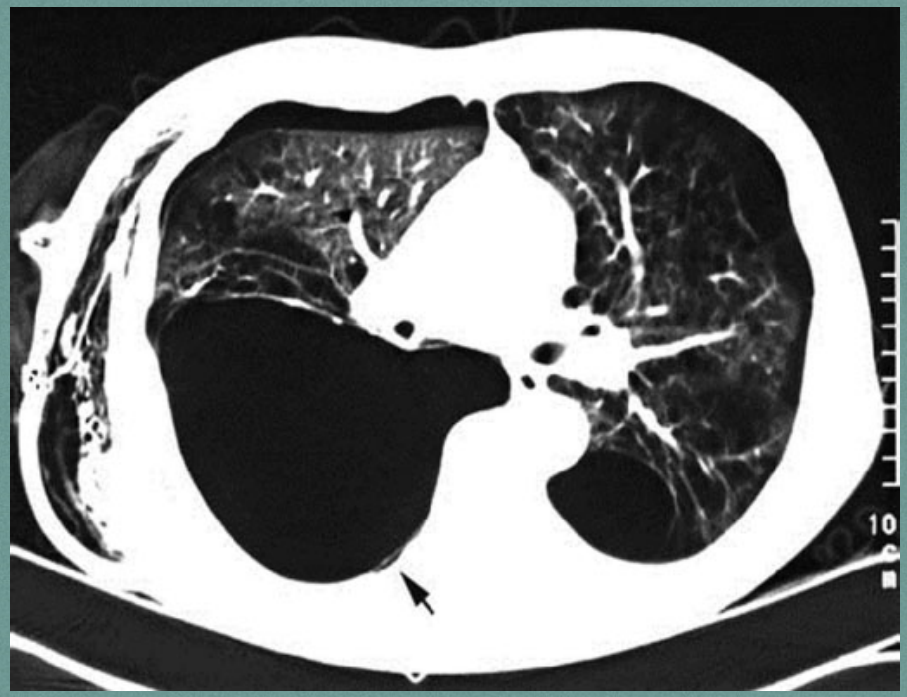
→ Apex of the upper lobes or superior segment of the lower lobes





Pneumothorax – Secondary Spontaneous PNX

Caused by several pulmonary and non-pulmonary disorders



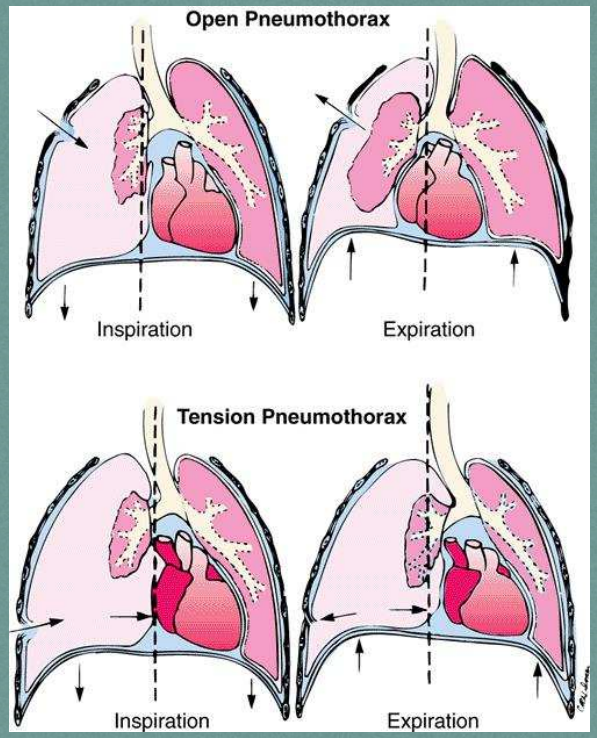
Pneumothorax – Secondary Spontaneous PNX

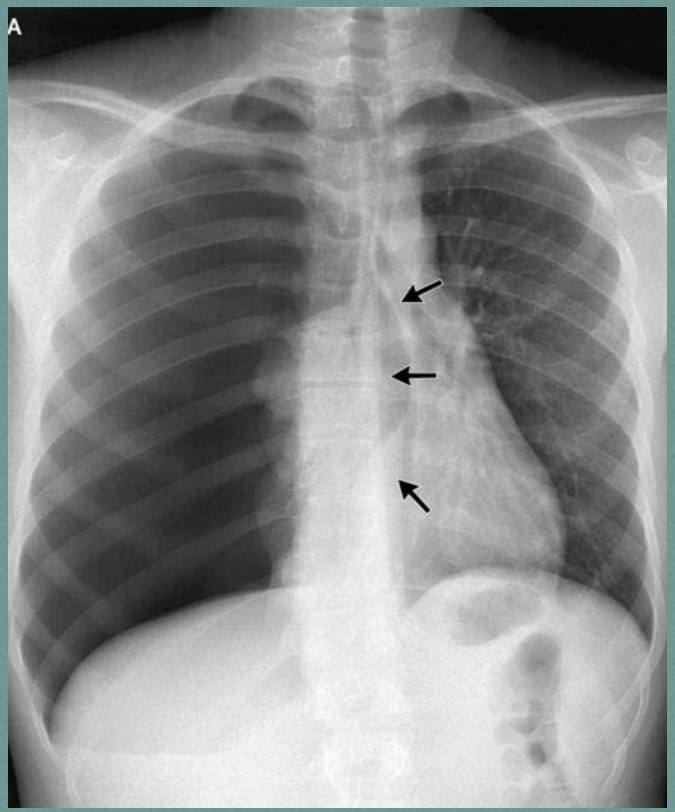
Common Causes for Secondary Spontaneous Pneumothorax

1. Asthma
2. Cystic fibrosis
3. Pulmonary fibrosis
4. Tuberculosis and Bacterial infections
5. Parasitic infections, Mycotic infections
6. Acquired immunodeficiency syndrome (AIDS)
7. Bronchogenic carcinoma
8. Metastatic lung disease
9. Radiotherapy
10. Marfan syndrome, Ehlers–Danlos syndrome

Pneumothorax – Emergency Situation

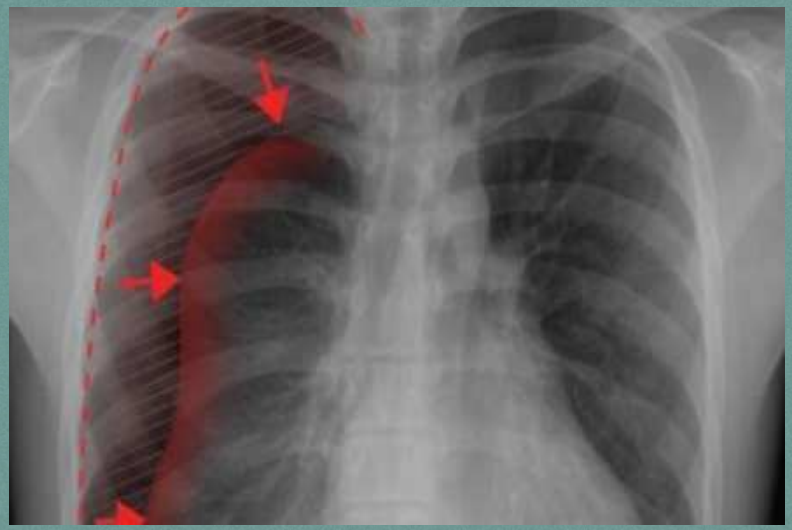
Tension Pneumothorax





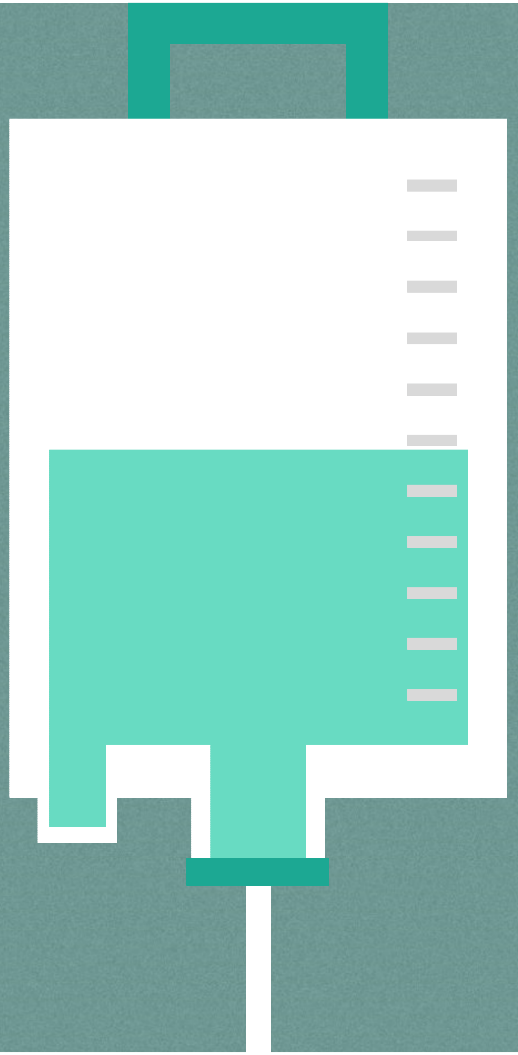
Pneumothorax – Symptoms

- Chest pain
- Dry cough
- Dyspnea
- Tachycardia
- Cyanosis
- Hypotension



Pneumothorax – Treatment

1. Oxygen administration with observation and bed rest
2. Simple aspiration
3. Small-bore catheter insertion
4. Tube thoracostomy
5. VATS – Bullectomy / Wedge resection / ±Pleurodesis / ± **Covering**
6. Open thoracotomy



Pneumothorax – Treatment

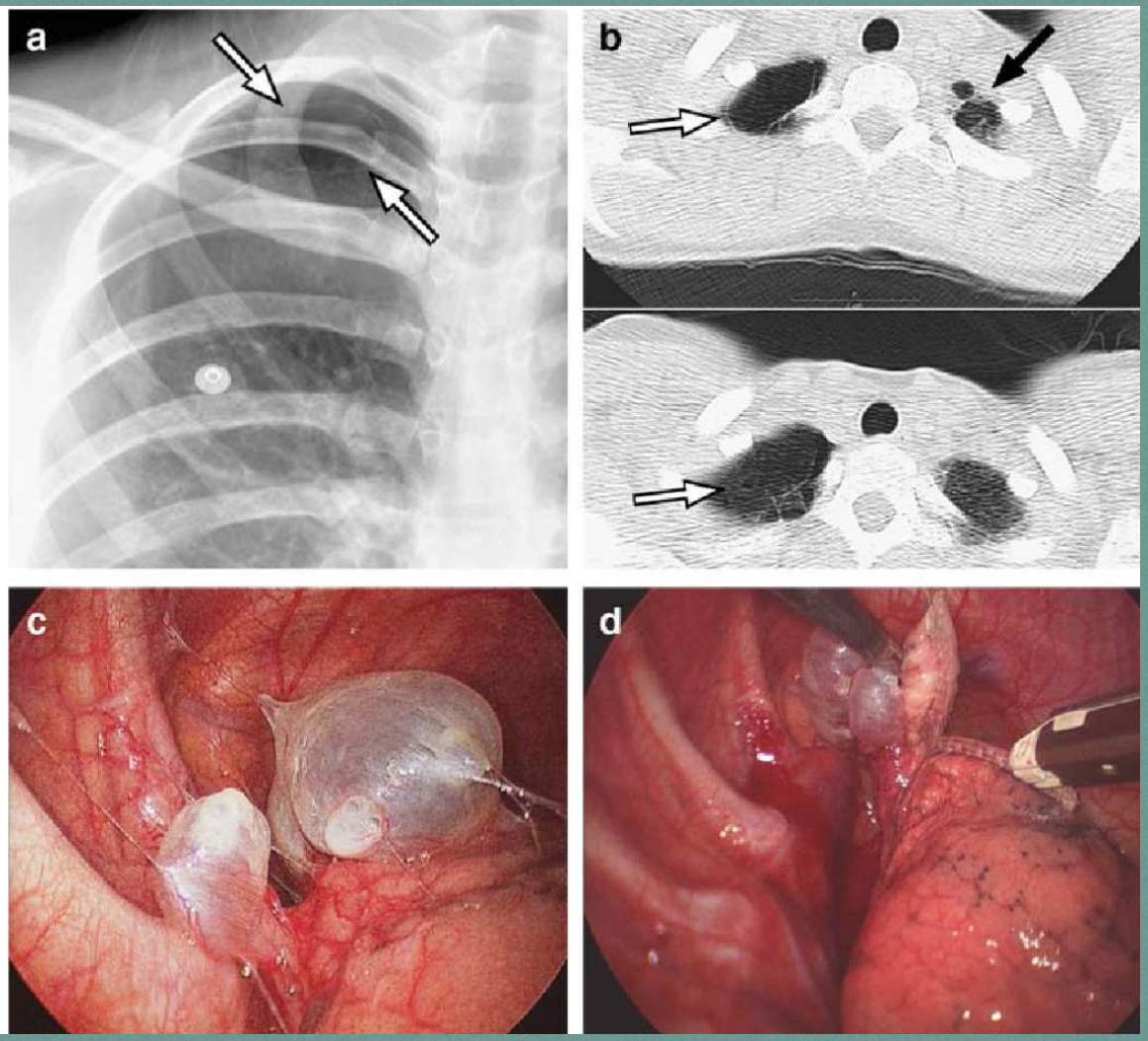
Surgical Indication

- **First episode**

1. Prolonged air leak
2. Non–re-expansion of the lung
3. Bilateral pneumothorax
4. Hemopneumothorax
5. Tension pneumothorax
6. Occupational hazard
7. Absence of medical facilities in isolated areas
8. Associated single large bulla

- **Second episode**

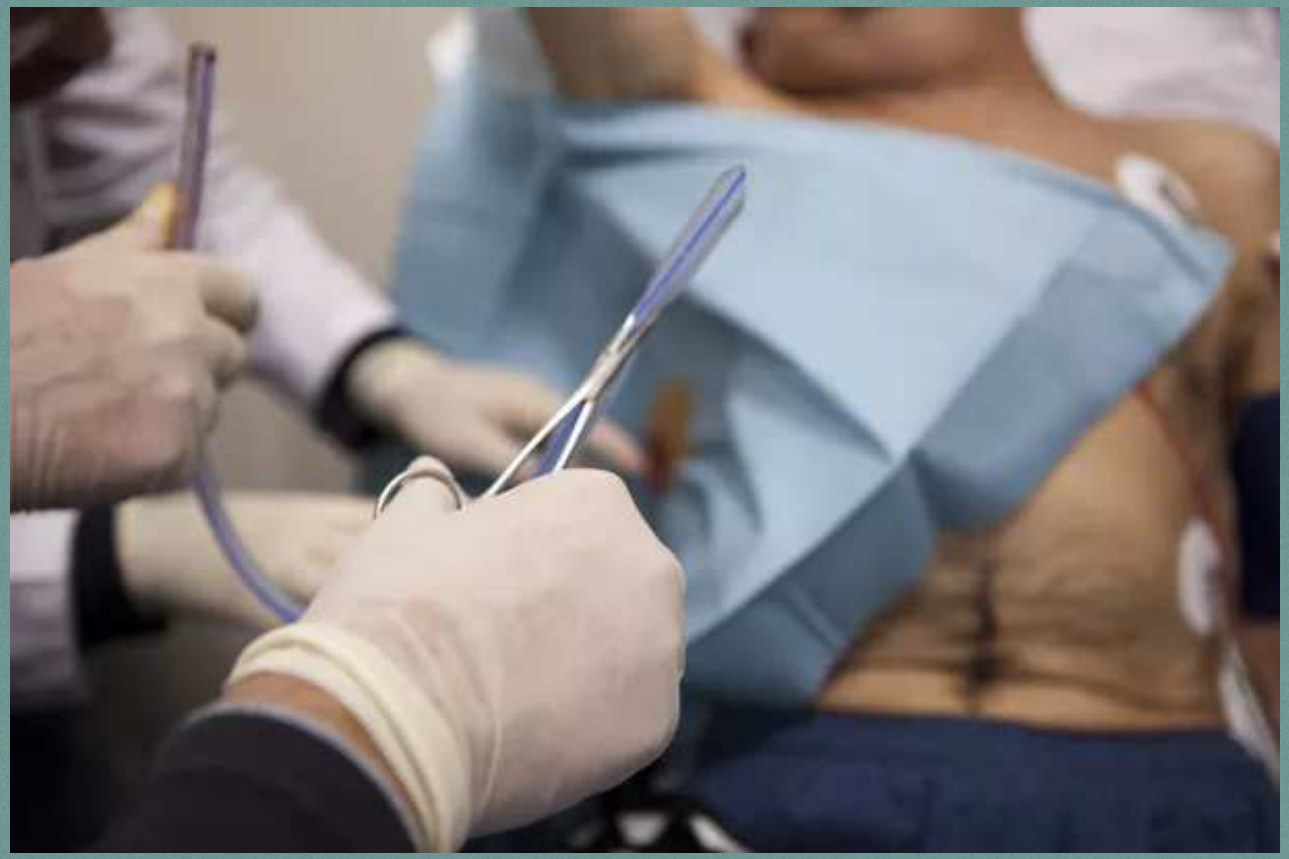
1. Ipsilateral recurrence
2. Contralateral recurrence


a
b
c
d

Chest Tube Insertion

Chapter.2

Chest Tube Insertion



Chest Tube Insertion - Indication

Table 1. Indications for Chest-Tube Insertion.

Emergency
Pneumothorax
In all patients on mechanical ventilation
When pneumothorax is large
In a clinically unstable patient
For tension pneumothorax after needle decompression
When pneumothorax is recurrent or persistent
When pneumothorax is secondary to chest trauma
When pneumothorax is iatrogenic, if large and clinically significant
Hemopneumothorax
Esophageal rupture with gastric leak into pleural space
Nonemergency
Malignant pleural effusion
Treatment with sclerosing agents or pleurodesis
Recurrent pleural effusion
Parapneumonic effusion or empyema
Chylothorax
Postoperative care (e.g., after coronary bypass, thoracotomy, or lobectomy)

Chest Tube Insertion – Careful Situation

1. Transudative pleural effusions due to liver failure
2. Anticoagulation, coagulopathy
3. Localized skin or soft tissue infection
4. Pleural adhesions, previous pleurodesis, or prior pulmonary surgery

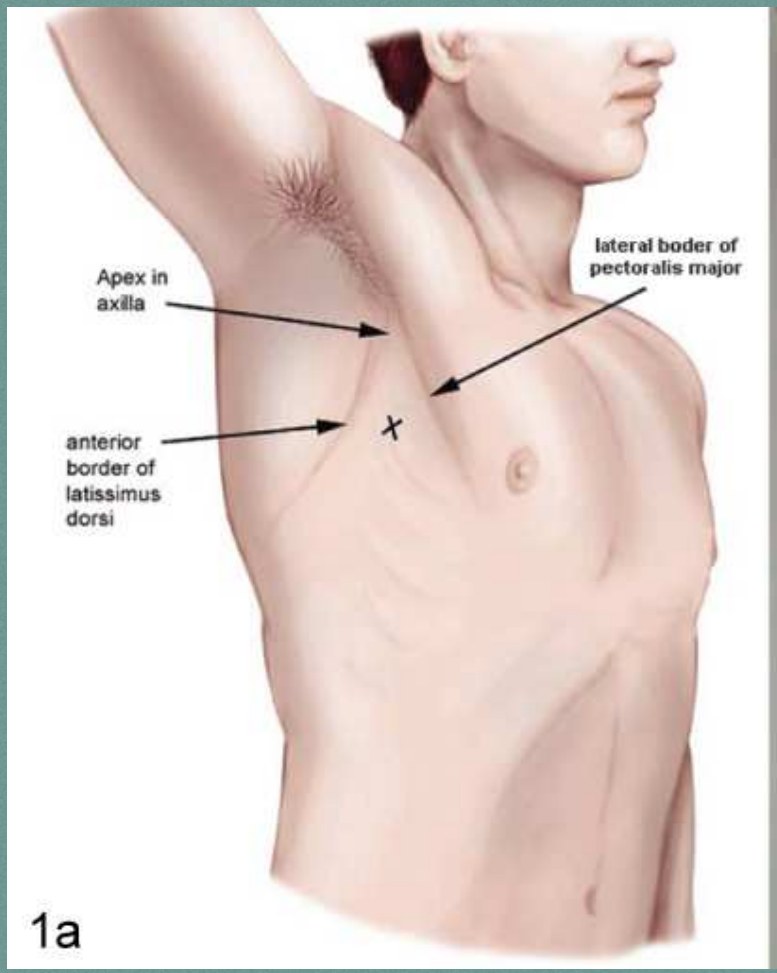
Chest Tube Insertion – Tube Sizing

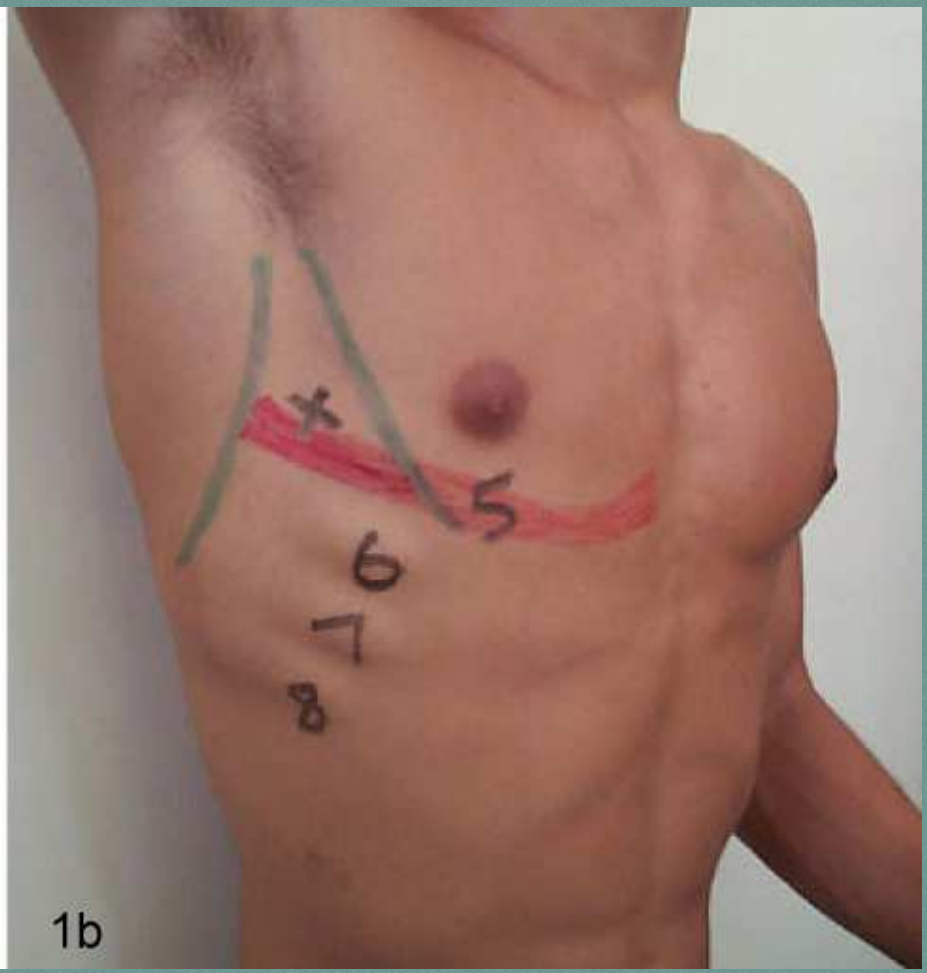
Patient age	Patient weight	Air	Serous fluid	Pus	Blood
Neonate/newborn	<11 lbs (<5 kg)	8 to 14 Fr	8 to 14 Fr	8 to 14 Fr	14 to 20 Fr
Infant/child	11 to 22 lbs (5 to 10 kg)	8 to 14 Fr	8 to 14 Fr	12 to 18 Fr	18 to 24 Fr
	22 to 33 lbs (10 to 15 kg)	8 to 14 Fr	8 to 14 Fr	12 to 18 Fr	18 to 24 Fr
	33 to 44 lbs (15 to 20 kg)	8 to 14 Fr	8 to 14 Fr	18 to 24 Fr	18 to 24 Fr
	44 to 66 lbs (20 to 30 kg)	8 to 14 Fr	8 to 14 Fr	18 to 24 Fr	18 to 24 Fr
Preteen/teen/adult*	>66 lbs (>30 kg)	8 to 14 Fr (percutaneous preferred) 24 Fr (via open)	8 to 14 Fr (percutaneous preferred) 24 Fr (via open)	24 to 32 Fr	24 to 36 Fr

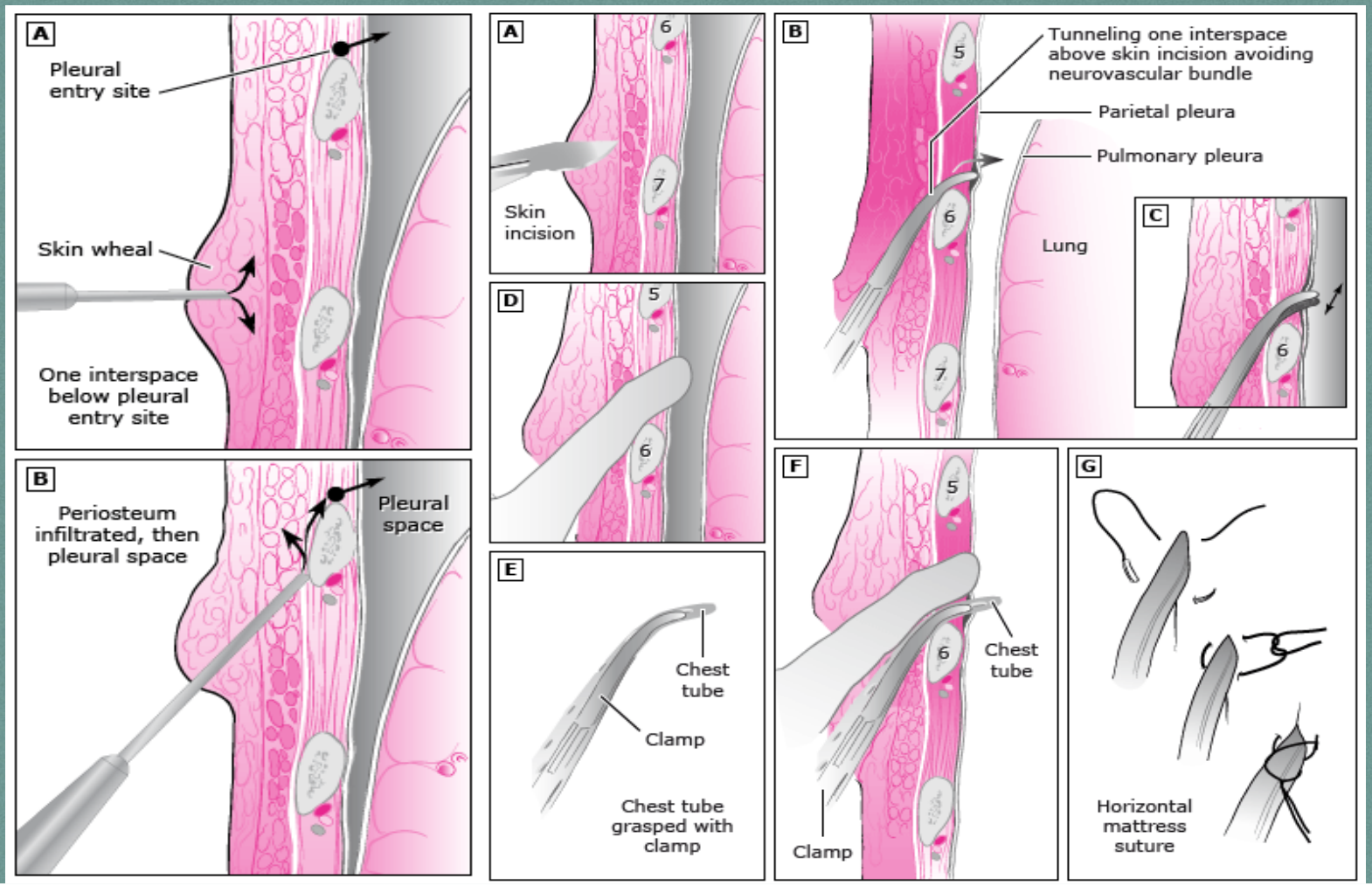
* The size of the tube also takes into account the size of the patient relative to age, as well as body habitus.

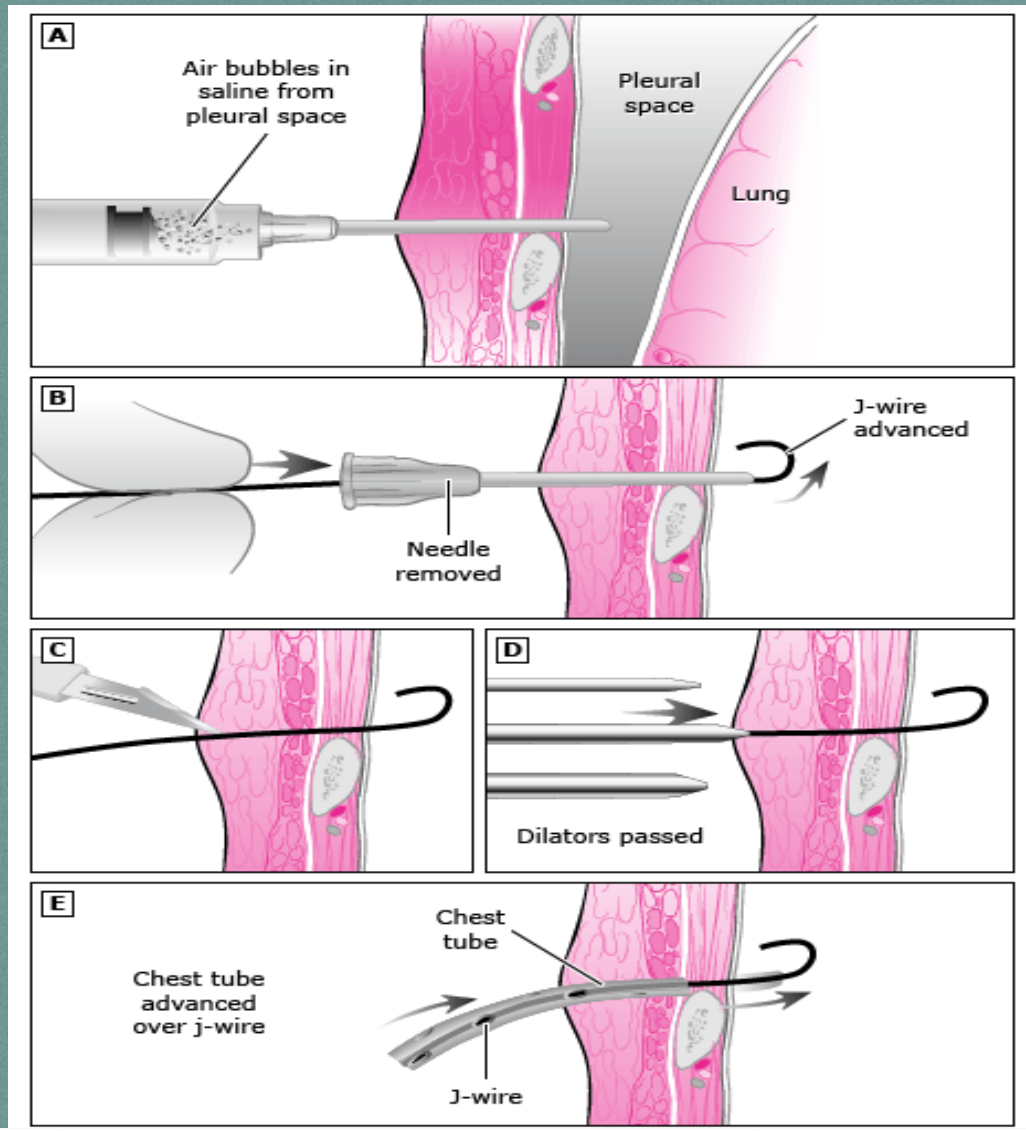
References:

1. *Baldwin S, Terndrup TE. Thoracostomy and related procedures. In: Textbook of Pediatric Emergency Procedures, 2nd ed, King C, Henretig FM (Eds), Lippincott Williams & Wilkins, Philadelphia 2008.*
2. *Havelock T, Teoh R, Laws D, et al. Pleural procedures and thoracic ultrasound: British Thoracic Society Pleural Disease Guideline 2010. Thorax 2010; 65 Suppl 2:ii61.*
3. *Light RW. Pleural controversy: Optimal chest tube size for drainage. Respirology 2011; 16:244.*


Apex in
axilla
lateral boder of
pectoralis major
anterior
border of
latissimus
dorsi
x
1a


x
5
6
7
8
1b


A
Pleural entry site
Skin wheal
One interspace below pleural entry site
B
Periosteum infiltrated, then pleural space
Pleural space
A
6
7
Skin incision
D
5
6
E
Chest tube
Clamp
Chest tube grasped with clamp
B
5
Tunneling one interspace above skin incision avoiding neurovascular bundle
Parietal pleura
Pulmonary pleura
6
Lung
7
C
6
F
5
6
Chest tube
Clamp
G
Horizontal mattress suture


A
Air bubbles in saline from pleural space
Pleural space
Lung
B
J-wire advanced
Needle removed
C
D
Dilators passed
E
Chest tube advanced over j-wire
Chest tube
J-wire

Chest Tube Insertion – Complication

- Intraparenchymal fistula from **injury of the lung**
- Inserting the chest tube **within a fissure** of the lung
- Damage to the neurovascular bundle underneath the rib
- **Pulmonary edema** secondary to lung **re-expansion**
- Tension pneumothorax from an occluded or clamped tube
- Persistent pneumothorax
- **Subcutaneous emphysema**
- **Injury to the diaphragm**
- Placement into the peritoneum
- **Infection** (specially pneumonia)
- **Bleeding** from the chest wall (due to injury of the intercoastal artery)

Chest Tube management

Chapter.3

Chest Tube Insertion – Management

Check List

1. Function: Tube and/or bottle → Oscillation
2. Air-leak: Continuous / Intermittent
3. Amount: Totally, daily, **hourly(!)**
4. Color: Serous, sanguineous, purulent
5. Location: Rt. or Lt. / Anterior or posterior

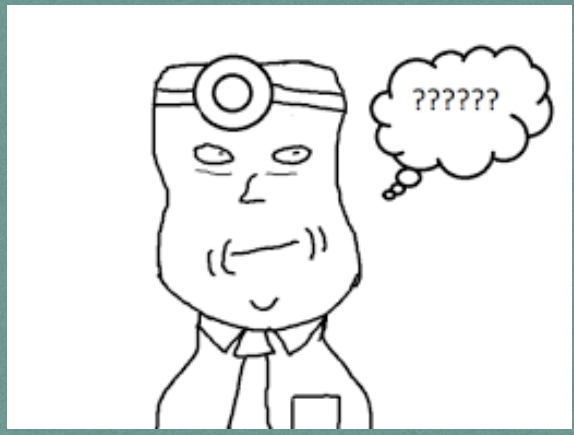
Bleeding

Massive air-leak with respiratory distress

Chest Tube Insertion – Management

Removal Indication

1. No longer fluctuation in the fluid column
2. Air leak has stopped for more than 24hrs
3. Minimal daily drainage
    1) < 100-200 mL per 24hrs
    2) < 10-15 mL per 24 hours in children with parapneumonic effusion



Chest Tube Insertion – Management

Removal Technique

1. End-inspiration or Valsalva maneuver
   → Positive pleural pressure
2. Quickly pulled out & cover with the gauze Immediately
3. Sealing of the removal site
   1) Purse string suture
   2) Compressive dressing (±Vaseline gauze)
   3) Skin staples
   4) Adhesives (Dermabond®)

알아서, 잘, 안새게!! + **예쁘게, 불편하지 않게!!**

Thank You for Your Attention!