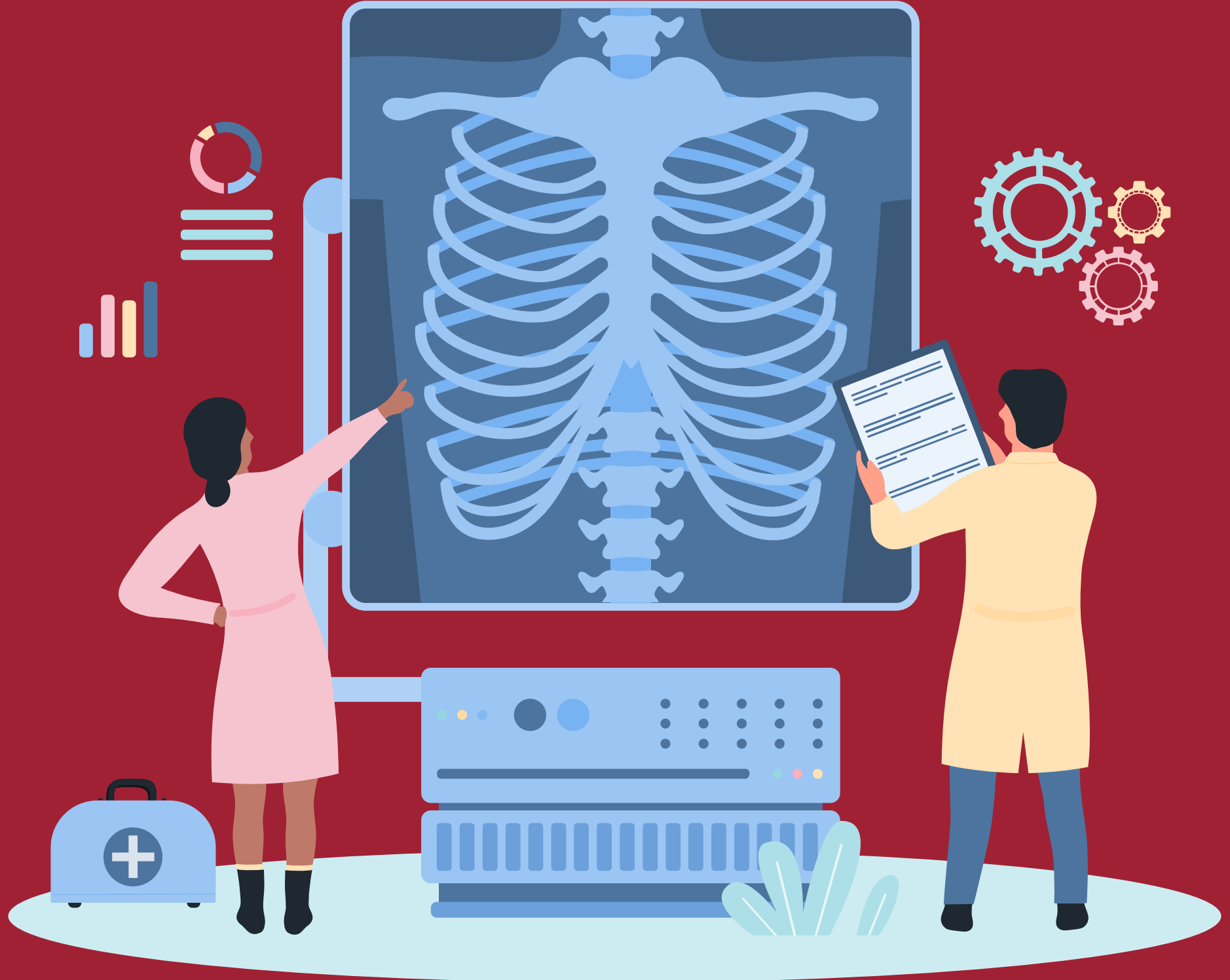




MUMIM'S

PNEUMOTHORAX

Pneumothorax refers to the presence of air in the pleural space (i.e. between the parietal and visceral pleura)

Classification of Pneumothorax

1 SPONTANEOUS PNEUMOTHORAX

Occurs without a precipitating external event

PRIMARY



No evidence of underlying lung disease, usually due to subpleural bullae rupture in tall, healthy young males

SECONDARY



Lung disease is present (e.g. COPD, tuberculosis, asthma, interstitial lung disease, cystic fibrosis)

2 TRAUMATIC PNEUMOTHORAX

Iatrogenic (e.g. following thoracic surgery or biopsy) or chest wall injury



Clinical features of Pneumothorax

- Sudden-onset unilateral pleuritic chest pain
- Dyspnoea
- Absent breath sounds
- Hyperresonance
- $\pm$ Subcutaneous emphysema

**There may be no signs if the pneumothorax is small*



Tension Pneumothorax

- Life-threatening emergency!
- One-way valve system allows air to enter pleural space but not to escape → intrapleural pressures rises above atmospheric levels → mediastinal shift towards opposite side → compression of the normal lung (respiratory compromise), and impairment of systemic venous return (cardiovascular compromise)
- usually occurs in patients with underlying lung disease or trauma or patients on positive pressure ventilation, extremely rare in patients with primary spontaneous pneumothorax



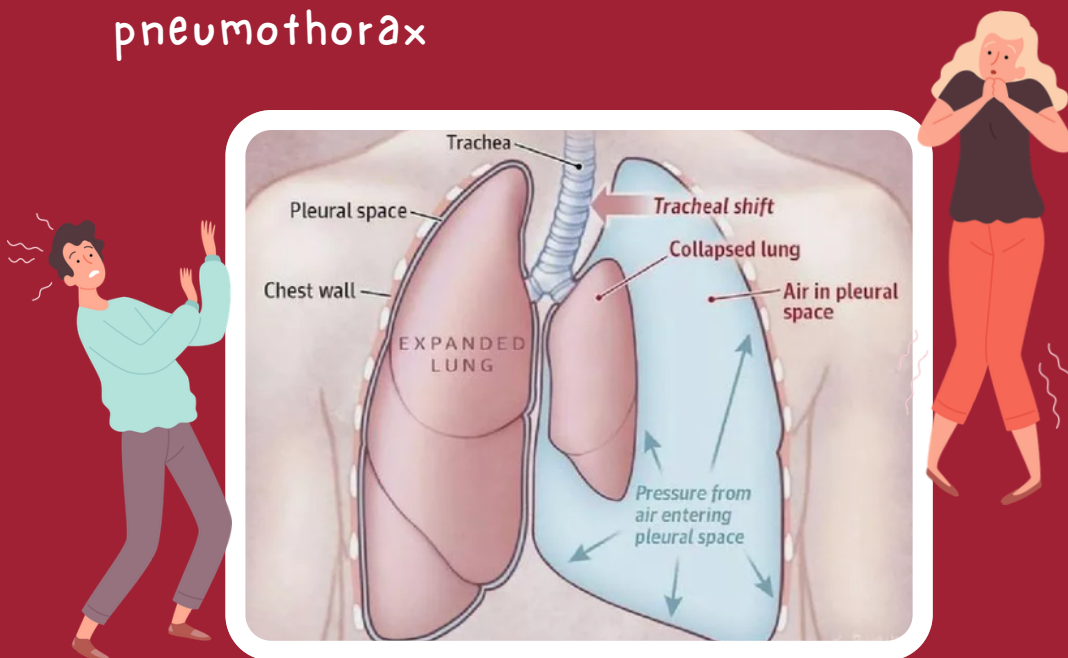
CLINICAL FEATURES

- Tracheal deviation away from affected side
- Hyperresonance of affected side
- Absent breath sounds
- Clinically unstable (e.g. severe dyspnoea, tachycardia, hypotension, hypoxaemia, cyanosis)

**DIAGNOSIS IS CLINICAL!
NOT RADIOLOGICAL!**

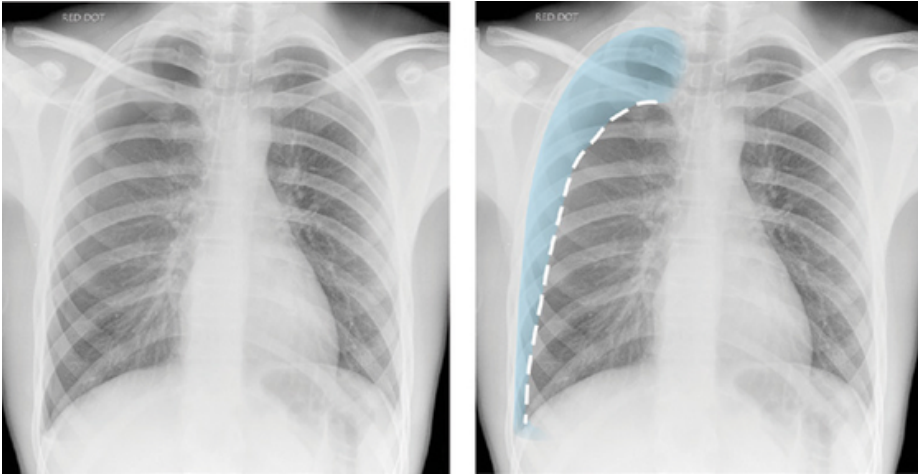
MANAGEMENT

- Put out an immediate cardiac arrest call
- Give high-flow oxygen
- *Immediate* needle decompression followed by chest tube insertion



CXR Findings

PNEUMOTHORAX

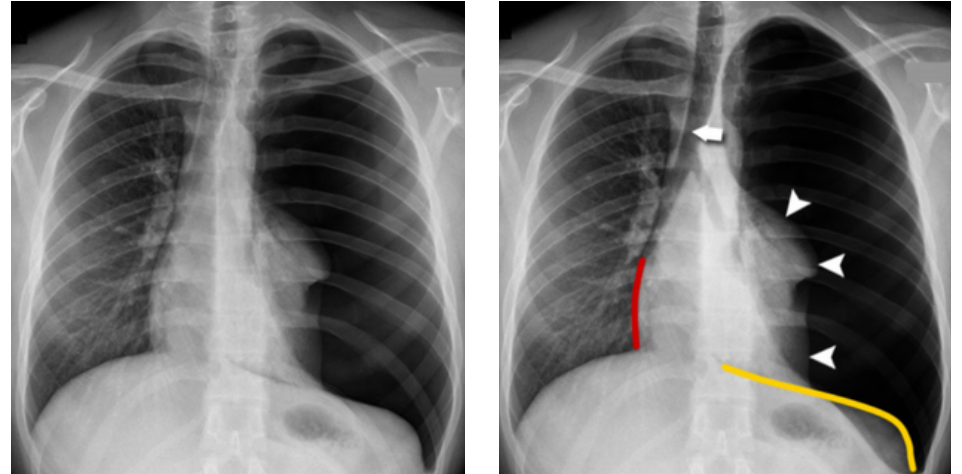


- Right lung edge is seen
- Absent lung markings lateral to the lung edge
- Vascular markings on opposite lung slightly more prominent
- No mediastinal shift

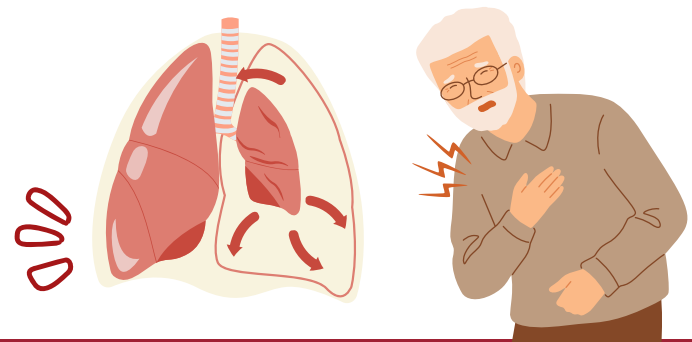
Be careful not to confuse the outline of the scapula for the lung edge!

In stable patients who can sit upright, CXR is the 1st-line investigation to definitively diagnose pneumothorax

TENSION PNEUMOTHORAX



- Left lung completely compressed
- Trachea pushed to the right
- Heart pushed to the right
- Left hemidiaphragm depressed



If you diagnose a tension pneumothorax clinically, DO NOT WAIT for imaging to confirm the diagnosis - TREAT THE PATIENT!

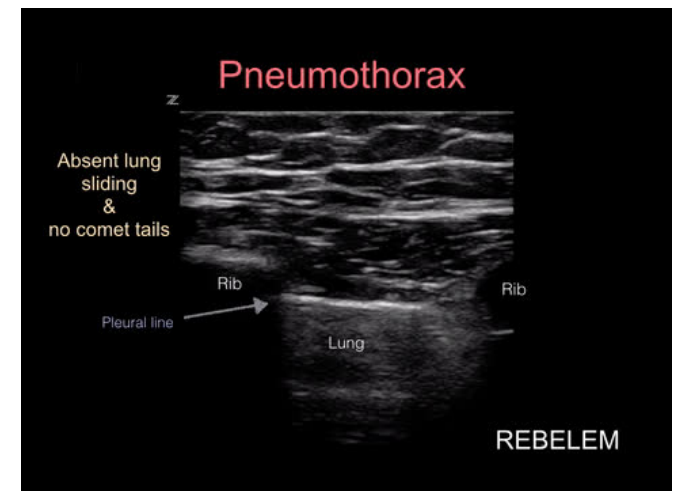
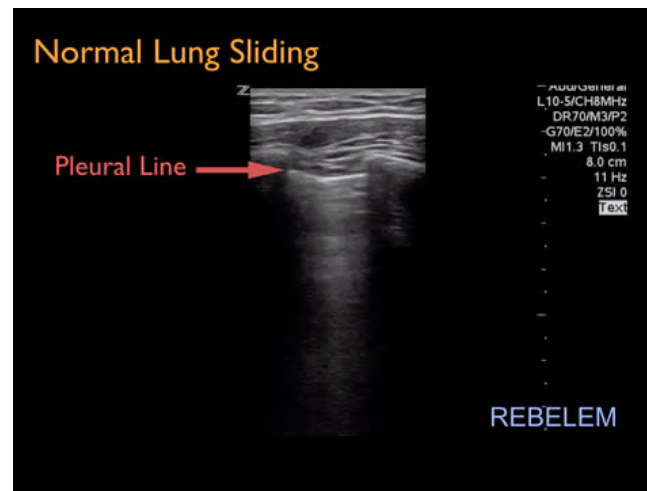
Ultrasound Findings

Useful in patients who are immobilised following trauma, when an erect PA chest x-ray cannot be obtained.

Absence of lung sliding

The parietal and visceral pleura slides back and forth on each other with normal respiration.

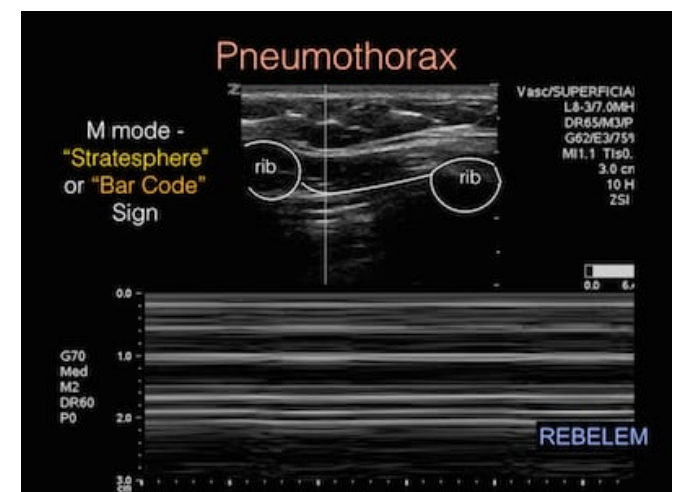
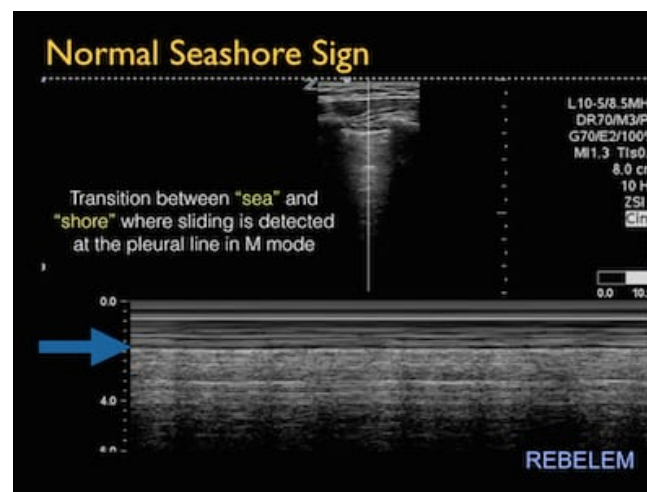
This sliding is absent in pneumothorax.



Barcode / stratosphere sign in M-mode

Normal lung: “seashore sign” (transition of line differentiating movement), indicating lung sliding is present.

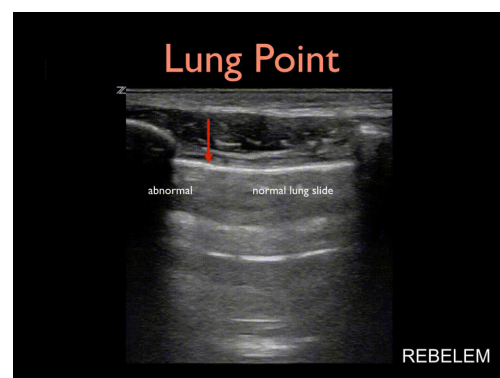
Pneumothorax: single “barcode” pattern, indicating no lung sliding.



M-mode: motion mode, represents movement of structures over time

Lung point or transition point

Transition between normal sliding lung and no sliding at the pneumothorax border



Pleural Interventions for Pneumothorax

Intervention

Indications

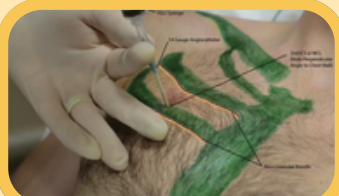
Location / Technique

Needle decompression/ needle thoracostomy



- Tension pneumothorax

2nd ICS mid-clavicular line
OR
4th ICS mid-axillary line



Catheter/needle aspiration



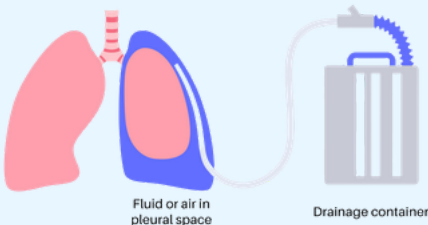
- 1° spontaneous pneumothorax

2nd ICS mid-clavicular line
OR
4th ICS mid-axillary line



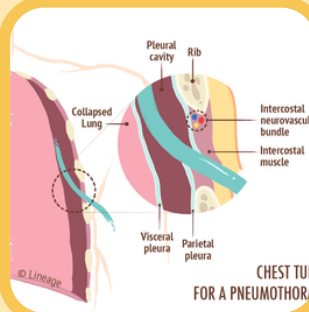
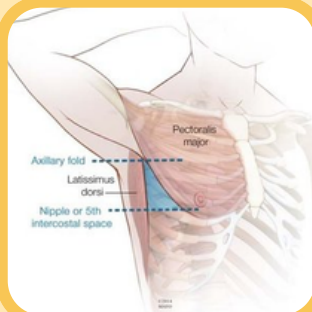
Tube thoracostomy/ intercostal chest drain/ Chest tube

Connected to underwater seal
or Heimlich valve



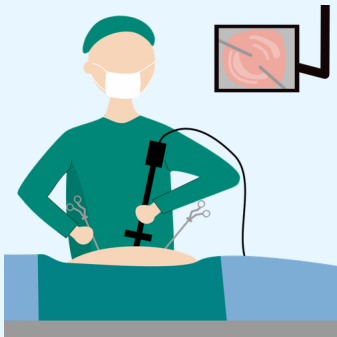
- 1° spontaneous pneumothorax
That was initially treated with catheter aspiration but did not respond
- 2° spontaneous pneumothorax
Unless the pneumothorax is small and patient is asymptomatic
- Traumatic pneumothorax
- Tension pneumothorax, following urgent needle decompression

Safety triangle



Thoracic surgery

Via thoracotomy or video-assisted thoracoscopy (VATS)

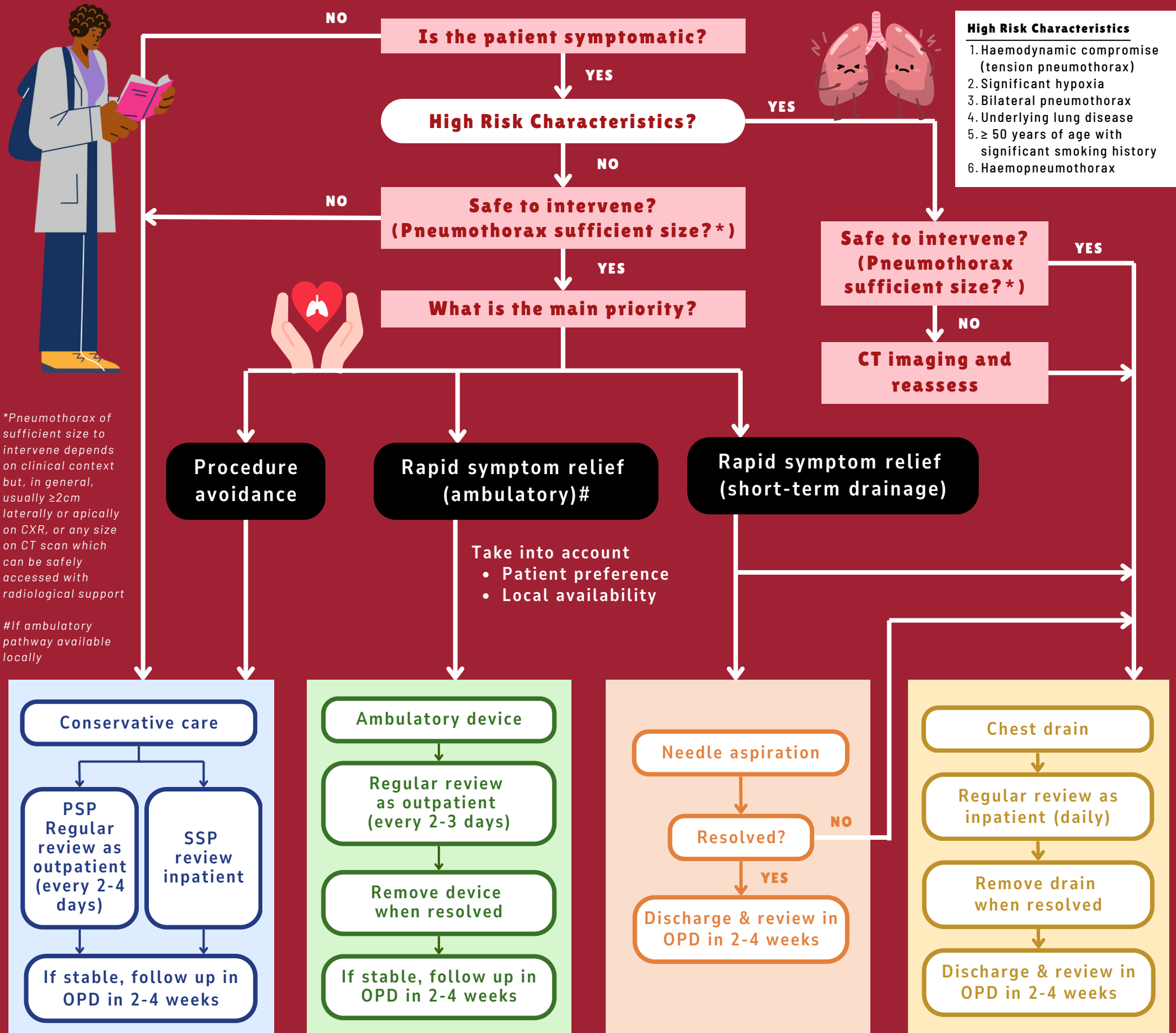


- First pneumothorax presentation associated with tension
- First 2° pneumothorax associated with significant physiological compromise
- Recurrent pneumothorax
- Synchronous bilateral spontaneous pneumothorax
- Persistent air leak
- High-risk occupations (e.g. pilots, divers)

Resection of lung parenchyma (bullae) to remove source of air leak
or
Surgical pleurodesis to obliterate the pleural space (pleural abrasion, partial pleurectomy, talc poudrage)



Pneumothorax Management Algorithm



References

1. Davidson's Principles and Practice of Medicine 22nd Ed.
2. British Thoracic Society Guideline for pleural disease 2023 Appendix 1
3. https://www.researchgate.net/figure/British-Thoracic-Societys-triangle-of-safety-detailing-anatomic-borders-for-placement-of_fig1_301685988
4. <https://www.nursingcenter.com/clinical-resources/nursing-mnemonics>
5. <https://geekymedics.com/needle-thoracocentesis-chest-decompression-osce-guide/>
6. Netter's Introduction to Clinical Procedures 2017 Ed.

