* Pleura :- A cavity that contains the lungs
  - 2 membranes → Visceral : adherent to the lung tissue
  - → Parietal : lining of thoracic cage
  - The space between them : potential pleural space / cavity
    - → contains 5-10 ml of viscous fluid
      - For : lubrication of the lungs (During inflation / deflation)

* Visceral Layer : Adherent to the lung → so : its nerve supply + blood supply + venous drainage + lymphatics → Same as the lung
  - → Also enters the fissures of the lung (like the oblique + transverse in the right)

* Functions of the pleura :-
  - Protection
  - Produces fluids for lubrication (between the 2 layers) during inspiration / expiration

infection/inflammation in the pleura : this fluid is decreased ⇒ ↑ Friction between the 2 layers

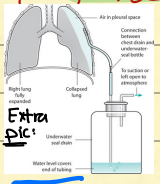
Pain in the parietal layer NOT the visceral [why? bcz
- Visceral : sensetive for stretch only (only supplied by Sympathetic / Parasym.)
- Parietal : sensetive for pain + touch + temprature (Has sensory N.S)

= Pleuritis → sever pain with breathing ⇒ Doesn't resolve on its own (needs treatment) → (If bacterial for eg) Antibiotics)

is segmental → if the infection is in the 5th intercostal space
- → Supplied by the 5th intercostal nerve
  - → ∴ the pain is in this area (5th intercostal space)

* In the Pleural cavity :- (between the parietal & visceral)

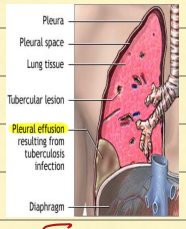
* Pneumothorax → Air gets inside the pleural cavity and accumelates (Usually due to a stab wound on the chest)
  - → Leading to : Lung collapse & shrinkage



Extra pic

Treatment : Underwater seal
① Fill a bottle with water ② Put a cannula between the bottle & the pleural cavity ③ Suction of the air from the cavity

* Pleural effusion → Fluid accumelation (can reach 300 ml instead of 5-10 normally)
  - → after infection, trauma, tumor or spontaneously
  - → Usually in the lower part of the pleural cavity
  - → ↓ Lung expansion + ↓ breath sound in stethoscope + Dullness in percussion + pain & cough (during breathing)



* Empyema → pus accumelation in the pleural cavity after a chronic infection

* Hemothorax → Blood accumelation in the pleural cavity / sac
  - → Treatment : Aspiration of the fluid / pus / blood

* And all of these cases cause difficulty in breathing bcz the sac is filled with other substance than the lubricating fluid impeding lung inflation & deflation

* Parietal pleura → has different types ⇒ According to its site

① → cervical pleura (surrounding the apex of the lung) → Remember! 1 inch above the medial 1/3rd of clavicle or 3-4 cm above the 1st C.C

↳ Clinically: Here we put a cannula in the subclavian vein in the upper surface of the 1st rib

↳ in this area we have a groove containing the artery + vein (ant to the artery)

↳ If you missed this surface anatomy, you will cut the pleura → Lung collapse

↓

So: a lung x-ray should be performed after putting the cannula to make sure that the lung is intact & able to inflate normally

3 pleural layers at the apex / dome:
- 1- Visceral pleura
- 2- Parietal pleura (cervical)
- 3- Suprapleural membrane

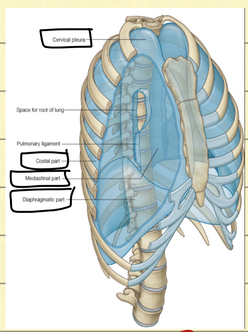
↓ ceiling the thoracic cage + induce a pressure inside the thoracic cage

② → Costal pleura → related to costal cartilages between the ribs / costal cartilages

↳ Largest surface (From C.C 1 → C.C 8+9+10)

③ → Diaphragmatic pleura (covering the base / diaphragmatic surface inferiorly)

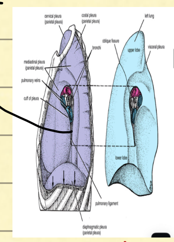
④ → Mediastinal pleura (covering the medial surface of the lung)



Around the hilum → Fusion between parietal + visceral (تلتزق)

Forming a sleeve around the hilum ⇒ to form the pulmonary ligament inferiorly

*Location of the hilum: between T5 & T7 (the 5th + 7th thoracic vertebrae)



* Surface anatomy of pleura

→ Sup: 3-4 cm above 1st costal cartilage / 1-3 inches above medial 1/3rd of clavicle

↳ (same as the surface anatomy of the lung apex) بالنص لا تعتمد عا بعض

→ Ant. border: (Different between the right + left)

- Right: Instead of ending at the 6th C.C (like the lung), in the pleura it ends at the 7th costal cartilage

هاي فقط حدودها الي. الها علاقة بال Lung (لكن عكس تنزل لحد ال 7th)

- Left: We have the cardiac notch! (between the 4th & 6th C.C)

↳ the same in pleura + lung ⇒ 1cm deviated to the left

(لا هو عامل ض دائرة الي داخلة على ال lung) This 1cm is the radius ↲ (the diameter = 2 cm)

* importance of the notch: aspiration of fluids in cardiac tamponade

↳ between 4th + 6th C.C (No pleura / No lung)

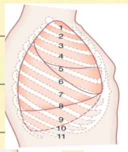
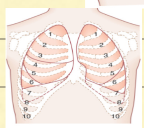
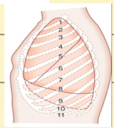
→ Post. border: Same as the lung but the pleura descends 2 more intercostal spaces

└→ Base / lower border:

	Lung	pleura (2 spaces below)
- midclavicular line	to → 6th C.C	to → 8th C.C
- midaxillary line	to → 8th C.C	to → 10th C.C
- scapular line / paravertebral line (posteriorly)	to → 10th thoracic vertebra	to → 12th thoracic vertebra

* importance : In inflation of the lung ⇒ filling of the 2 spaces
→ so: if fluids/air accumelated in these 2 spaces → no available space for the lung inflation ⇝ ↓ ability to breathe normally

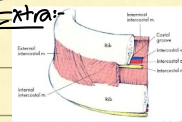
: لذا
→ Aspiration ⇒ But where? in the costodiaphragmatic recess (in 3 points) :-
OR underwater seal

- midclavicular line : 7th intercostal space (1 inch)
  (between the lung (6th C.C) & pleura (8th C.C))
  to avoid injury of the lung
- Best place → Midaxillary line : 9th intercostal space (3 inches)
  └→ cuz it's wide (3 inches)
  (between 8th + 10th C.C)
- Rare → Scapular line dorsally : 11th intercostal space (2 inches)

But where exactly in the space ?? ↓

* Where is the subcostal groove ? Lower border of the rib

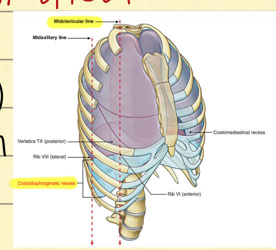
Extra:

To avoid injury of the space contents (BVs + nerve)

So: the needle is inserted on the lower border of the intercostal space & on the upper border of the rib

* Recesses / reflections / angles : The angle between 2 types of parietal pleura (Giving a space for inflation of the lung)
(الزاوية تكون بتمشي لتحت فقط)

- Costo-diaphragmatic —— أهم واحد بال inspiration ——→ filled with lung tissue during inspiration
  └→ in midaxillary → 3 inches in size (Widest space) → so: it's the preferred site for aspiration (in the 9th intercostal space)
- Costo-mediastinal
- mediastino-diaphragmatic

(costodiaphragmatic is the most common site for accumelati~ of fluids / blood / pus)



* Suprapleural membrane → above the apex of the lung (above the 2 layers of pleura)
(Fibrous sheath)

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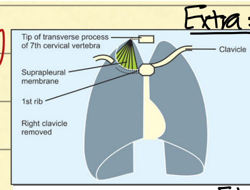
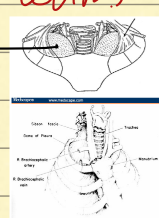


└ Attachments:

suprapleural membrane ←


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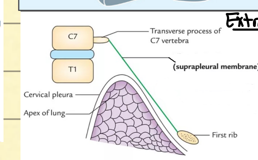


* Laterally → inner / medial border of 1st C.C

* medially → blends with sibson's fascia (investing deep fascia at the root of the neck)

* Apex → Tip of the transverse process of the 7th cervical vertebra (C7)

عشان نحافظ على ال :
intrathoracic pressure

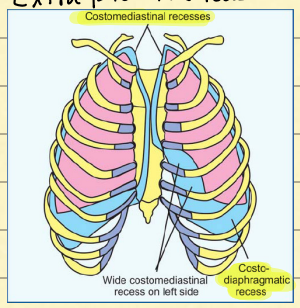
يعلوا :
All these attachments (esp. with the sibson's fascia): Complete ceiling of the thoracic cavity

* importance of the supra pleural membrane :-

- Protection of apex

- Resists changes in intrathoracic pressure during respiration

Extra pic: The recesses:-



* Normal person breathes 18- 24 times per min

↳ The respiratory center sends impulses to phrenic nerve to diaphragm

Inspiration (Active process):

So: the diaphragm contracts & descends downwards

+ Increasing the intra-abdominal pressure
Decreasing the intra-thoracic pressure (below Patm)

Rush of air through the nose (بيدخل هوا) ⟹ Filling the lungs

expiration (passive process):

* Completely the opposite : Relaxation of diaphragm → moving upwards → ↑ intra-thoracic pressure → pressing on the lungs

* Same as when we perform tracheostomy → air rushes in & enters the trachea

* Stab wound at the root of the neck

↳ Cut of the pleura → Reaching the lung ⟹ Pneumothorax → Lung collapse

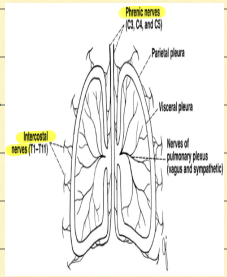
↳ Hitting the supra pleural membrane only without reaching parietal pleura
↳ The breathing is normal (Lung is intact)
But: intra-thoracic pressure would be affected → so: the supra pleural membrane bulges upwards with breathing (During changes in intrathoracic P)

* nerve supply of parietal pleura → sensetive to pain, touch & temp

- Costal pleura → intercostal nerves *(segmentally)*
For e.g) 3rd intercostal space → 3rd intercostal nerve

- Mediastinal
- Diaphragmatic
→ Phrenic nerve (From C3+C4+C5) → motor to diaphragm + Sensory to pleura

- Cervical pleura → intercostal nerves



* Nerve supply of visceral pleura → Autonomic N.S (sympathetic & parasympathetic) → (pulmonary plexus)
  - → So: sensetive to stretch + insensetive to pain, touch & temp.

* Blood supply of pleura:
  - Visceral → same as the lung: Bronchial arteries
  - Parietal → Ant surface / post
    - Ant surface → Anterior intercostal arteries (Branch of the internal thoracic A.)
    - post → Posterior intercostal arteries (Branches of descending thoracic aorta)
    - → 1- Intercostal arteries (ant + post)
      2- Internal thoracic / mammary A.
      3- Musculophrenic A. → to 6th + 7th + 8th intercostal spaces

(Subclavian artery → Internal thoracic / mammary A. → Ant. intercostal A.
Musculophrenic A. → end branch)

(Descending thoracic aorta → Gives the post. intercostal arteries from 3rd → subcostal (12th))

* Venous drainage → Right side: Azygous vein
  - → Anteriorly: internal mammary / thoracic vein + subclavian vein

* Lymphatic drainage
  - Visceral → with the lung → along the bronchial arteries → to: bronchopulmonary L.Ns
  - Parietal → mediastinal pleura: • mediastinal nodes (on hilum) • tracheobrandeal • Intercostal
    Diaphragmatic pleura: • Parasternal • Post. mediastinal

They all go to:
1- Thoracic duct (on left side)
2- Right Lymphatic (on right side)
Both drain at the beginning of brachiocephalic veins → left + Right