Disease of The Pleura:

Pleurisis: → Inflammation of pleura
↳ often localized
(same thing)

↳ **Pleurisy:** causes Pleuritic Chest pain
↳ often 2nd to pleuritis

↳ **Pleuritic chest pain:** → pain prevents you from breathing
↳ Sharp localized (Stabbing) Chest pain
↳ worse: → Cough
→ Deep inspiration

Aetiology:
↳ Infective → pneumonia
→ viral (Coxsackie B)
→ TB
↳ collagen vascular disease → SLE
↳ Rheumatoid Arthritis
↳ other: Uraemia (Renal failure)
: Pulmonary Infarction

↳ **Bornholm's disease:**
↳ Coxsackie B virus → young fit adults!
↳ clinical Presentation:
↳ URTI; pleuritic chest pain
Myalgia (muscle pain/ache)
↳ CXR = normal
↳ self-limiting: NSAID's; Analgesics

Pleural Effusion: → Excess fluid → pleural space
→ normal = 0.1 – 0.2 ml/kg

patho-physiology: → Imbalance of Starling forces
→ Impaired lymphatic drainage
→ Pleural Inflammation

Aetiology:
↳ **Transudate:** ↓ Protein [ ]
: Pathology outside lung
: Bilateral (usually)

↳ **Exudate:** ↑ Protein [ ]
: Disease of lung/pleura
: Unilateral (usually)

NB

Transudates:
- congestion (cardiac fail)
- ↓ Albumin
↳ Nephrotic syndrome
↳ Liver cirrhosis
↳ Malnourishment
- Diaphragm leaking (peritoneal Dialysis)
- Hypothyroidism
- PE (but also Exudate)

Exudates
Infective → TB, parapneumonic
Malignancies ↳ ↑ ADA
collagen vascular disease → SLE/RA
Chylothorax
Trauma
Subdiaphragmatic → pancreatitis/liver Abscess
PE
Sarcoidosis/Asbestos Exposure etc.

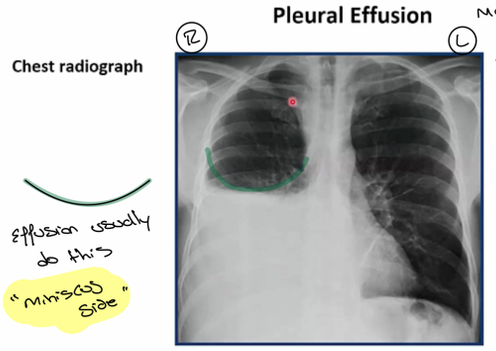
Clinical Presentation: — Pleuritic Chest Pain
— Dyspnoea + cough
— "Heavy" Sensation
— weight loss (other)
[NB look at History]
→ Mediastinum shifted (Away from Effusion)

Physical Exam → Stony Dull (percussion)
→ ↓ fremitus + ↓ Breath sounds
↳ Check lymph nodes + clubbing NB!!

NB **Vocal fremitus** ↳ ↑ → Denser lung tissue
→ Inflamed lung tissue (pneumonia)
↳ ↓ — ↑ air/fluid
↓ lung tissue

Pleural Effusion May be asked in Exam → x ray meets images

- Chest radiograph

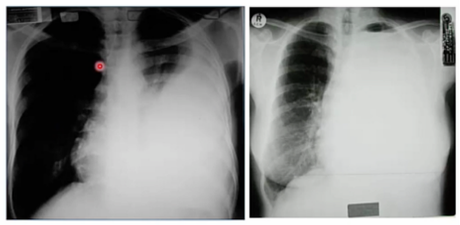


Effusion usually do this
"Mirrored Side"

Not effusion
↳ High sitting diaphragm

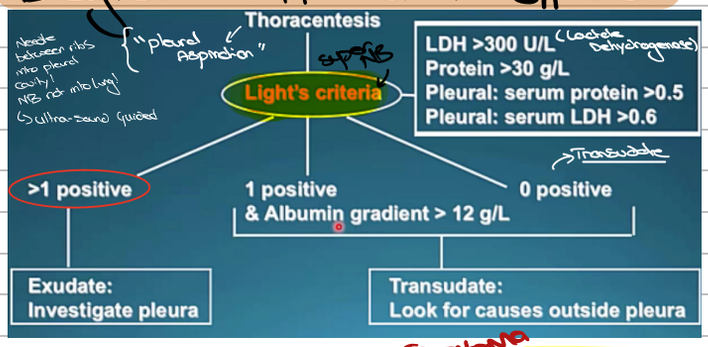
Pleural Effusion

- Chest radiograph



This eg see mediastinum moved indicates effusion; usually sign of lung Ca

Diagnostic Approach to Effusion



Exudate + poly Maphranuchee = Empyema

Pleural Aspiration Judged by:

1) **Macroscopic Appearance** (+ Smell)
- Empyema → Purulent, foul smell
- Straw colour: TB
- Bloody ← Malignant / Trauma / Infarction
- Milky: Chylothorax
- Ammonia smell: Urine

Straw = TB
ADA = Adenosine deaminase

2) **Biochemistry**
- Protein & Albumin
- LDH (↑ in malignancies & Empyema)
- ADA (> 50 U/L suggests TB in setting of lymphocytic effusion)
- TG > 110 mg/dL = Chylothorax
- pH < 7.20 → complicated parapneumonic
- Other: Glucose; Amylase; RF etc.

(Parapneumonic: 2nd to pneumonia)

3) Cytology → malignant cells (TB same Malig.)

4) Cell predominance: Lymphocytic:
: Neutrophils: parapneumonic
: Eosinophils: Pneumothorax/Asbestos Exposure
: RBC: malignancy / Trauma

5) Microbiology: → Routine MCS
: TB: Stains for AFB's (ZN)
↳ Liquid culture media (BACTEC™ / MGIT 960™)
↳ Gene Xpert™: PCR for TB
↳ Also tests Resistance

Pleural Biopsy: Ultrasound guided (closed)
↳ Abrams needle
↳ Histology; TB culture
⇒ Main complications → Pneumothorax, Haemoptysis, Bleeding from site

Thoracoscopy
↳ Medical: Sedation
: Single port of entry
↳ Surgical: GA (Anaesthetist)
: Lung collapsed
: 2 ports of entry

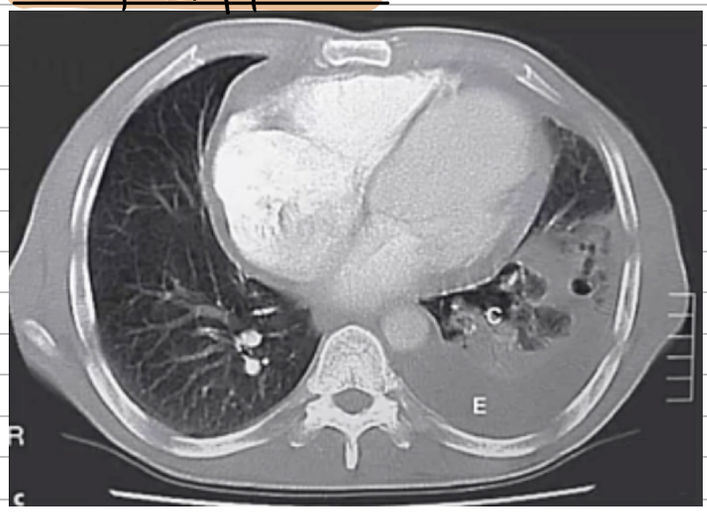
Pleural Effusion Management:
↳ txt of cause
↳ Symptomatic Aspirations → Pain killers + Aspirate fluid
↳ ICD (Intercostal Drain)
: Empyema
: complicated parapneumonic effusions
: Symptomatic Malignant effusions
⇒ **Pleurodesis**: Chemical (Sclerosing Agent) (via ICD)
↳ Fibrosis forming induction
: Surgical
NB ↳ Stick parietal & visceral pleura together
↳ Fluid can't accumulate.

Empyema: → Pus in pleural space
↳ 2nd: Pneumonia & Lung Abscess
: Bronchiectasis
: Rare: Surgery etc
↳ 3 phases: 1) Exudative
2) Fibropurulent
3) Organising

Aetiology: Streptococcus Anginosus Group
Staphylococcus Aureus
Streptococcus pneumoniae ← most common cause of pneumonia
Mycobacterium tuberculosis

Clinical Presentation: → Same as Pleural Effusion
↳ Ranges from Acute to Indolent course (illness)
↳ Draining Sinuses = Rare (Empyema necessitans)

CT of Empyema:



↳ can see consolidation ∴ not just an effusion.

Empyema management: Don't Stress Details

Table 1. Risk of poor outcome in patients with parapneumonic effusions and empyema

Category	Pleural space anatomy		Pleural fluid chemistry		Pleural fluid bacteriology	Risk of poor outcome	Drainage
1	Minimal, free-flowing effusion (<10 mm)	and	pH unknown	and	Gram stain and culture results unknown	very low	no
2	Small to moderate free-flowing effusion (≥10 mm and <½ hemithorax)	and	pH ≥7.20	and	negative Gram stain and culture	low	no
3	Large, free-flowing effusion (≥½ hemithorax), loculated effusion, or effusion with thickened parietal pleura	or	pH <7.20	or	positive Gram stain and/or culture	moderate	yes
4	Empyema				pus	high	yes

↳ **Antibiotics**: Augmentin or Clindamycin (Co-amoxiclav) → Monotherapy for Abscesses too
↳ **Drainage** (ICD) / Surgery in complicated cases
↳ **fibrinolysis** = controversial (tPA with DNASE)
↳ dissolve strands to drain easier?

Chylothorax: (Chylomicrons / Lymph)
↳ collection of Chyle (Lymph)
↳ usually from Leakage of Thoracic Duct
↳ **Aetiology**: Trauma → most common in SA.
: Malignant infiltration
↳ of Thoracic Duct = Leak.
↳ **Presentation**:
↳ Large pleural effusion
↳ pleural Aspiration = milky
= TG > 110 mg/dL
↳ Imaging - CT chest
- Lymphangiogram
↳ **Management**:
↳ conservative (may resolve spontaneously)
↳ txt of cause
↳ Various ICD → Loss of lots of Lipids = could malnourish patient
NB
↳ Get Dietician in
↳ Surgery - pleuro-peritoneal shunt
- ligation of thoracic duct.

Neoplasms of the Pleura

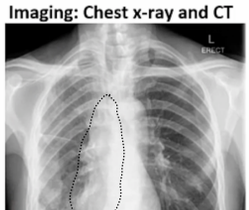
- Benign: Solidarity fibrous tumour (SFT) — most common benign tumour
- Malignant: primary → Malignant Mesothelioma — Rare though
  - more common than ↵ primary (common place for Ca to metastasis to)
  - : 2nd / Metastatic
    - Lung
    - Breast
    - Stomach
    - Lymphoma

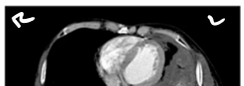
SFT: → can be as large as a Rugby ball in chest
- Large ; well circumscribed
- presentation: Clubbing ; Hypoglycaemia — NB
  - : pleural effusion (only 17% of patients
- txt : Resection (Good prognosis)
  - ↳ lung transplant.

Malignant Mesothelioma:
- Highly malignant tumour of the pleura / peritoneum (Both = asbestos)
- → peaks 35-45 years after exposure
- ⇒ Strongly associated with Asbestos Exposure
  - (even lowest of doses is enough)
- 3 Histological Subtypes → Epithelial, → Sarcomatoid, → Biphasic (mixed)

presentation: Local invasive tumour (obliterates space)
Pleural effusion, trapped lung
Mediastinal invasion
Distant metastasis (late)
Paraneoplastic – Hypercalcaemia & Hypoglycaemia
- → ↑ Ca^{2+} / ↓ Glu — NB

- Malignant Mesothelioma
  - Imaging: Chest x-ray and CT
    - Pleural effusion
    - Pleural-based mass
    - Constriction of hemithorax (volume loss)
    - Widening of mediastinum
    - Evidence of asbestos exposure – plaques





Diseased side = R. can see it growing into ♡ this one also grows outside of chest.

DX: Pleural Aspiration (low yield) ; Pleural Biopsy ; thoracoscopy ; Surgical biopsy

txt: Surgery (Extrapleural pneumonectomy)
Palliative Radiotherapy & Chemo
Pleurodesis → chemical / surgical

Prognosis: Very poor (Most patients <2 years)

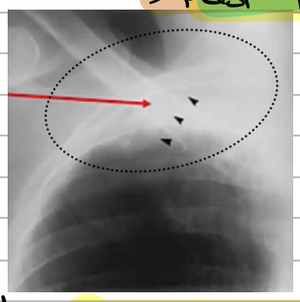
2nd Malignancies (more common than Mesothelioma)
- 30-50% of patients with metastatic Malignancies will have pleural involvement.
  - 50% of these = effusion.

Dx with pleural Aspiration ; image guided biopsy or thoracoscopy

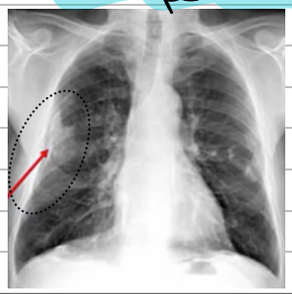
Palliative management
- ICD with pleurodesis
- Intrapleural catheter (IPC)
- Thoracoscopy

Pleural Thickening, Calcification & Plaques

- pleural thickening +/- calcification
  - often involves costophrenic Angle / Apex.
  - Evidence of past inflammation / trauma: (ie. it is evidence for)
    - TB
    - Empyema
    - Past Haemothorax



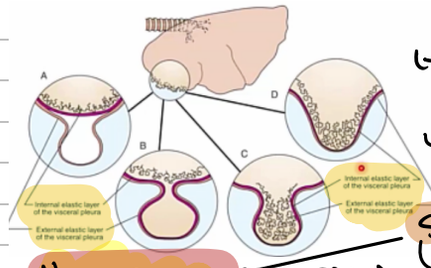
- Pleural Plaques → Evidence of past Asbestos exposure
  - typically involves lateral & posterior pleural surfaces
  - central portion of Diaphragm



Pneumothorax → Air in the pleural Space!

- Spontaneous (No trauma)
  - 1° = Absence of Disease
  - 2° = underlying Disease (Eg. COPD)
- Acquired (Trauma)
  - 1° = Iatrogenic
  - 2° = Traumatic

1° Spontaneous → tall men 20-40 years, smokers
→ Rupture of subpleural blebs / bullae
→ 25% Recurrence Rate (within 2 yrs)



Clinical presentation:
- pleuritic chest pain (sudden onset)
- Dyspnoea
- coughing

Signs: Cyanosis, Trachea displacement (opposite side)
- Hyperresonance (percussion)
- Absent breath sounds

Tension Pneumothorax

NB NB NB

↳ Medical Emergency!

↳ such bad pneumothorax = (+) pressure

NB

= Impairs Resp & Circulatory systems!

= Displacement of organs in thoracic cavity

Mediastinum displacement = pre-load is so impaired (Return of blood flow)

-Severe Dyspnoea

- tachycardia (Hypotension) >140 BPM ← Reflex.
- Trachea clearly displaced.

-> ↑ JVP (↑ RV pressure)

Pneumothorax CXR:

↳ Delineated margin of collapsed lung

↳ Bronchovascular markings = Absent

↳ Small effusion present

→ pushing them Apart

=> Evidence of tension: Splaying of Ribs

: Depression of Hemi-diaphragm

: Mediastinal shift away from affected side!

- Chest radiograph

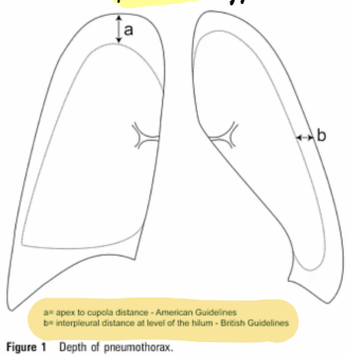
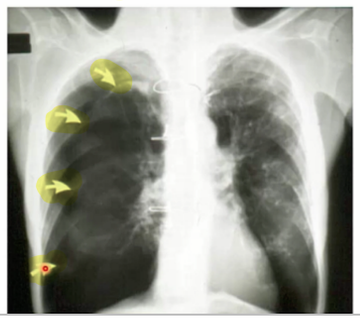
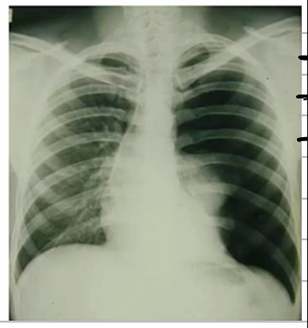


Figure 1 Depth of pneumothorax.

Darker = Air

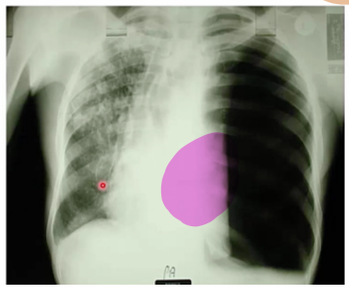
- Chest radiograph Arrows point to visceral pleura





- Chest radiograph

NB to always check where L/R is



Example of tension pneumothorax

Extreme shift of mediastinum

♡ supposed to be at

Need to take Action fast!

Pneumothorax Management:

↳ Basic principle: Remove air

: Achieve closure of Leak

: Asses & ↓ % of recurrence

Acute Management: Depends on Size

: patho-physiological Fx

: Spontaneous vs acquired

: first / subsequent Episode

=> Normal person = ok

Person with COPD etc. could die

Tension Pneumothorax: -NB Quick!.

↳ Large-bore needle inserted into 2nd ICS (MCL) → Below clavicle

↳ patient be prepared for immediate ICD!

=> non-/Minimally invasive:

↳ observation +/- O2

↳ Aspiration

- Resolves at 1.25% / day
- if no leak
- O2 ↑ rate
- Safe option for small pneumothoraces

↳ 4/5 th ICS Aspect 2.5 L with 50 ml Syringe

due to Microvessel damage after Rapid expansion of Lung.

=> Invasive Intervention: ICD

→ Anterior Axillary Line : Thoracoscopy

: VATS

: Thoracic Surgery

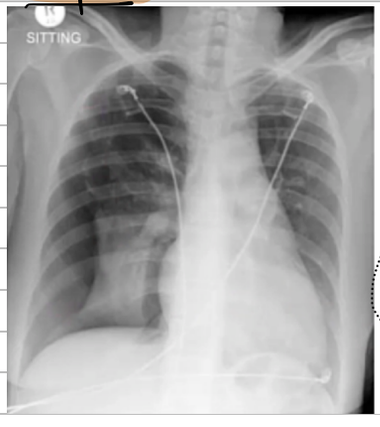
ICD: 4/5th ICS

↳ Reexpansion pulmonary oedema (seen in 14-25% of pts)

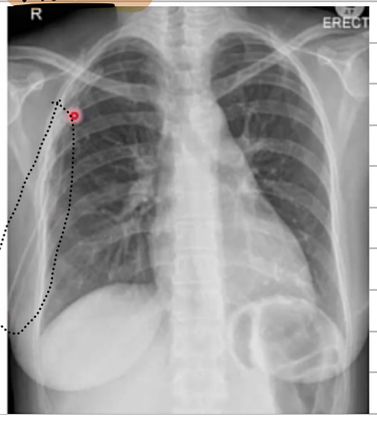
- Still leak after 48h = low pressure suction
- Surgical Intervention if leak for 5-7 days
- Chemical Pleurodesis (1° cases)

↳ (2° cases) = VATS / Surgery

Before:



After:



Prolonged Air-Leaks (5-7 days)

↳ VATS / Surgery

↳ if poor Surgical candidate:
(Eg Emphysema patient etc.)

↳ Blood Patch

↳ Heimlich Valves — one way valves

↳ Endobronchial valves

↳ Block Bronchus from inside

VATS (Video Assisted Thoracic Surgery)

↳ up to 3 points of entry (under GA)

↳ Leaking blebs / bullae = Stapled / Ligated

↳ pleurodesis formed

Divers & pilots = recurrence!
6.7% risk of recurrence

Surgery -> Thoracotomy (unilateral
-> median Sternocotomy (Bilateral)

↳ pleural scarification
total / Apical pleurectomy + bleb plication

Risk of Recurrence = 3.3%