Respiratory System

Department of Radiology & Imaging
Taking Plain Chest PA film

FFD = 6 f (1.85m)
Full inspiration
Centering at T5
Taking Chest AP (Supine) film

FFD = 48 “
Taking Chest Apical View

Tube Angled upward = 30°
Other Views

- Lordotic view
- Lateral decubitus view
- Oblique
PA vs AP views

**PA view**
- Scapula is seen in periphery of thorax
- Clavicles project over lung fields
- Posterior ribs are distinct
- Position of markers

**AP view**
- Scapulae are over lung fields
- Clavicles are above the apex of lung fields
- Position of markers
- Anterior ribs are distinct
Viewing Lateral Film

- Trachea
- Retrosternal space
- Heart
- Retrocardiac space
- Diaphragm
Bronchopulmonary segments

Right
RUL
RLL

Left
LUL
LLL

Right (Lateral)
RUL
RML
RLL
Bronchopulmonary segments

Right
- RUL
- RLL

Left
- LUL
- LLL

Left (Lateral)
- LUL
- Lingual

LLL
Cardiothoracic Ratio

Maximum internal thoracic diameter

Normal <50%
Measuring Diaphragmatic Height

Normal = 1.5 cm
Pleural Effusion (Left)
Pleural Effusion (Rt)
Bilateral Pleural Effusion
Pulmonary tuberculosis
Extensive Pulmonary TB
Miliary Opacities

- Widespread small discrete opacities of similar size up to 3mm in diameter
Causes of Miliary Nodules

- **Infectious disease**
  1. Tuberculosis
  2. Fungus (histoplasmosis, coccidioidomycosis, blastomycosis)
  3. Bacteria (salmonella, nocardia)
  4. Virus (varicella)

- **Metastasis** (Thyroid Ca, melanoma, adenoma, of breast, stomach & etc)

- **Granulomatous disease**
  1. Eosinophilic granuloma
  2. Sarcoidosis

- **Alveolar microlithiasis** (rare)

- **Bronchiolitis obliterans**

- **Gaucher disease**
Extensive Pulmonary TB
Collapse Right Upper Lobe

Opacity in RUL

Minor fissure displaced upward
Collapse

- Diminish volume of air in the lung with associated reduction of lung volume
Collapse

- Radiological sign
  - Direct sign
    - Opacity
    - Crowding of vessels
    - Fissural displacement
  - Indirect sign
    - Compensatory emphysema
    - Rib crowding
    - Mediastinal & hilar shift
    - Elevation of diaphragm
Consolidation (Rt Middle Lobe)

Opacity

Minor fissure not displaced

Obliteration of Rt cardiac border

air bronchogram
Lingular Segment Consolidation
Consolidation

- **Definition**

  replacement of air in one or more acini by fluid or solid material
Consolidation

- Radiological signs
  - usually large homogeneous shadowing
  - confined to segment & bounded by segmental margin (fissure, diaphragm, heart contour)
  - no evidence of loss of volume
  - air bronchogram
Causes of Consolidation

- **Inflammatory = Pus**
  1. Lobar pneumonia
  2. Bronchopneumonia
  3. Unusual pneumonia (Viral, Pneumocystis, Fungal, TB)
  4. Aspiration

- **Hemorrhage = Blood**
  1. Trauma: contusion
  2. Pulmonary embolism
  3. Bleeding diathesis (leukaemia, haemophilia, anticoagulants, DIC)
  4. Vasculitis (Wegener granulomatosis, SLE, etc)
  5. Idiopathic pulmonary haemosiderosis
  6. Bleeding metastasis: choriocarcinoma
Transudate = Water

1. Cardiac oedema
2. Neurogenic oedema
3. Hypoproteinaemia
4. Fluid overload
5. Renal failure
6. Shock
7. ARDS

Secretiion = Protein

1. Alveolar proteinosis
2. Mucus plugging

Malignancy = Cells

1. Bronchoalveolar cell carcinoma
2. Lymphoma

Interstitial disease: alveolar sarcoid
Bronchiectasis
Bronchiectasis

- Definition
  irreversible dilatation of one or more bronchi.
Causes of Bronchiectasis

- **Congenital**
  1. Congenital bronchiectasis
  2. Cystic fibrosis
  3. Katargener $\$
  4. Congenital hypogammaglobulinaemia

- **Obstructive**
  1. Localised obst: tumour, foreign body, L/N
  2. Generalised obst: chronic bronchitis, emphysema, asthma
- **Infection**
  
  Whooping cough, Measles, Childhood Pneumonia, Primary or post primary TB

- **Non-infective cases**

  1. Bronchopulmonary aspergillosis
  2. Inhalation of noxious fluid or gases
  3. Intrinsic connective tissue abnormality:
     - Ehler-Danlos $\$, Marfan's $\$, Sjogren $\$, Tracheobronchomegaly
Apical Mass Lesion
Rib Erosion
Chest Apical View
Pancoast Tumour
Multiple Pulmonary Nodules
Pulmonary metastasis
Causes of Multiple Pulmonary Nodules

- **Neoplastic:** metastasis (breast, thyroid, kidney, GIT)
- **Infections**
  1. Abscess
  2. Hydatid
  3. Histoplasmosis
  4. Coccidioidomycosis
- **Immunological**
  1. Wegener's granulomatosis
  2. Rheumatoid nodules
  3. Caplan's
- **Inhalational:** Progressive massive fibrosis
- **Vascular:** AVM
Cavitation lesions

- A cavity is a lucency exceeding 1 cm in diameter surrounded by a complete wall which is 3 mm or more in thickness.
Causes of Cavitatory lesions

- **Infective**: Staph aureus, Kleb pneumonieae, TB, Aspiration
- **Neoplastic**: Ca Bronchus, Metastasis, Hodgkin's
- **Vascular**: Infarction
- **Abnormal lung**: Cystic bronchiectasis, Bronchogenic cyst, Sequestrated segment, Infective emphysematous bulla
- **Granuloma**: RA nodules, Wegener's, Sarcoidosis
- **Traumatic**: Haematoma, Traumatic lung cyst
Visceral Pleural Line

PNEUMOTHORAX
Pneumothorax

Radiological features

1. **Lung edge**: a thin white line of lung margin, the visceral pleura
2. **Absent lung marking** between the lung edge and chest wall
3. **Mediastinal shift**: when a tension pneumothorax develop
Pneumothorax

 Causes

1. **Iatrogenic**: lung biopsy, chest aspiration, thoracic surgery, central line insertion
2. **Spontaneous**: common in tall thin young male, due to rupture of small pleural bleb
3. **Trauma**: stab wound, rib #, associated with surgical or mediastinal emphysema
4. **Secondary to lung disease**: emphysema, cystic fibrosis, interstitial lung disease
5. **Secondary to mediastinal emphysema**
Subcutaneous Emphysema
Hydropneumothorax
Multiple Rib Fractures
Pneumoperitoneum

- Radiological signs
  - Upright plain film: lucent crescent of air under the diaphragm
  - Supine film: air outlining both sides of the bowel wall (Ringler sign)
  - Foot ball sign: air outlining the entire abdominal cavity
  - Left lateral decubitus abdominal film: useful of equivocal & ill cases
Pneumoperitoneum

Causes

1. Perforation
   a. Peptic ulcer
   b. Inflammation: diverticulitis, appendicitis, toxic megacolon, necrotizing enterocolitis
   c. Infarction
   d. Malignant neoplasm
   e. Obstruction
   f. Pneumatosis coli

2. Iatrogenic: sugery, peritoneal dialysis

3. Secondary to pneumomediastinum
4. Secondary to pneumothorax

5. Through female genital tract
   a. Perforation of uterus/vagina
   b. Culdocentesis
   c. Rubin test: tubal patency test
   d. Pelvic examination

6. Intraperitoneal
   a. Gasforming peritonitis
   b. Rupture of abscess
Thank You