Basics of radiography & Introducton and basic interpretation of chest X ray

BASICS AND TECHNIQUES OF RADIOGRAPHY

- History
- Screen film radiography
- Fluroscopy
- CR computerised radiography
- DR- digital radiography

INTERPRETATION OF CHEST X RAY

- Various views
- Technical adequacy of the film
- Appearance of various tissues on x ray
- Normal anatomy
- Few important basic interpretations on chest x ray

BASICS OF RADIOGRAPHY TECHNIQUES

• X-rays were discovered in 1895 by Wilhelm **Conrad Roentgen** (1845-1923) who was a Professor at Wuerzburg University in Germany.





Techniques of radiography

According to the image receptor

- Conventional film screen radiography
- Computed radiography (CR)
- Digital radiography (DR)
- Fluoroscopy



FILM SCREEN CASSETTE



DR FLAT PANEL DETECTOR

CR CASSETTE









FILM SCREEN RADIOGRAPHY



Dark room processing in conventional radiography



CR CASSETTE



PHOTOSTIMULABLE PHOSPHOR PLATE PLACED INSIDE A CASSETTE which is reusable (USES BARIUM FLUOROHALIDE)

CR CASSETTE READER





X ray film

DR flat panel detector – TFT technology



Schematic cross section of scintilator and TFT-panel.



SCREEN FILM CASSETTE (conventional radiography)







COMPUTERISED RADIOGRAPHY (CR)

Phosphor Plate





DIGITAL RADIOGRAPHY DR





FLUOROSCOPY



Continuous X-ray image on a monitor, much like an X-ray movie.



APPLICATIONS OF FLUOROSCOPY

Barium X-rays and enemas (to view the gastrointestinal tract)
Catheter insertion and manipulation (to direct the movement of a catheter through blood vessels, bile ducts or the urinary system)
Angiography (DSA)
Orthopedic surgery (to guide joint replacements and treatment of fractures)

PRINCIPLES OF X RAY IMAGE AND DIFFERENT DENSITIES







CHEST X RAY VIEWS

CHEST X RAY PA VIEW





WHY PA VIEW AND NOT AP VIEW FOR CHEST X RAY



HEART BEING AN
ANTERIOR STRUCTURE
IS LESS MAGNIFIED IN
PA VIEW

MORE OF LUNG IS VISIBLE

CHEST X RAY LATERAL VIEW



CHEST X RAY AP VIEW



CHEST X RAY AP VIEW

- Supine position
- Usually in ill patients/ infants where erect position is not possible
- Tube cassette distance is shorter
- Heart is magnified cannot reliably comment on cardiomegaly

PA vs AP view



LATERAL DECUBITUS VIEW



USEFUL IN DETECTING MINIMAL PLEURAL EFFUSION NOWADAYS REPLACED BY ULTRASOUND

APICAL / LORDOTIC VIEW



APICAL / LORDOTIC VIEW



BETTER DEPICTS OPACITIES IN LUNG APEX AND MIDDLE LOBE PATHOLOGIES

TECHNICAL ADEQUACY

INSPIRATORY FILM



Anterior 5 – 6 th ribs / posterior 8 – 10 th ribs should be visible

INSPIRATORY VS EXPIRATORY FILM



PENETRATION



- Thoracic spine disc spaces should be barely visible through the heart. - Penetration is sufficient that bronchovascular structures can usually be seen through the heart.


ROTATION



ROTATED FILM WITH APPARENT MEDIASTINAL SHIFT



CHEST X RAY ANATOMY

Pattern approach in reading a chest x ray

- Systematic approach
- Consistency of the reading pattern
- Either from centre to outside or the otherway
- Look outside the chest



Trachea and bronchi



Hilum



•Hila formed by pulmonary arteries,veins,bronchi

 Prominent hila
dilated PA
Enlarged LNs
Mass lesion from the main bronchus

Diagnosis ???



Bilateral hilar lymph nodes enlargement

> Diagnosis SARCOIDOSIS

Spiculated Hilar mass – Calung



Position of the hilum



Elevated right hilum



Cardiac borders on CXR



Cardiac contour anatomy





HEART SIZE ON CHEST X RAY



Cardio thoracic ratio , NORMAL - < 50%

Cardiomegaly due to chamber enlargement



Cardiomegaly in pericardial effusion



Normal thymus in CXR of infants



LUNG ZONES



Costophrenic and cardiophrenic angles



PLEURAL EFFUSION – BLUNTING OF CP ANGLES



MINIMUM QUANTITITY OF PLEURAL FLUID REQUIRED TO BECOME EVIDENT ON ERECT CHEST X RAY - 200 – 250 CC

Free fluid vs loculated pleural collection – MENISCUS SIGN



DIAPHRAGM



RIGHT HEMIDIAPHRAGM IS HIGHER

DIAPHRAGMATIC PALSY



THORACIC CAGE AND BONES



SOFT TISSUES



Identify the abnormality !!



Few basic abnormalities on chest X ray



CAUSES FOR OPAQUE HEMITHORAX

Total lung collapse with ipsilateral mediastinal shift



Massive pleural effusion with contralateral mediastinal shift



Consolidation with air bronchogram sign



Pneumothorax



Bulla



Pulmonary cavity



Lung mass


Mutilple lung nodules – diagnosis??



