

IQRA NATIONAL UNIVERSITY

Department of Radiology (AHS)



Radiology Positioning

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(Question No 1)

Explain basic X-ray Projection of Femur and discuss its radiological findings?

➡ Femur-Antero-Posterior

Position of patient and image receptor

- The patient lies supine on the x-ray table with both legs extended.
- The affected limb is rotated to centralize the patella over the femur.
- The image receptor is positioned in the bucky tray immediately under the limb, adjacent to the posterior aspect of the thigh to include both the hip and the knee joints.
- Alternatively, the image receptor is positioned directly under the limb, against the posterior aspect of the thigh to include the knee joint.

Direction and centering of x-ray Beam

- Center to the middle of the image receptor, with the vertical central ray at 90 degrees to an imaginary line joining both femoral condyles.

Essential image characteristics

- The hip and knee joints should both be including on the image where possible.

Additional Consideration

- In suspected fractures, the limb must not be rotated.
- The knee and hip joints should be included on the image if this is impossible to achieve, then the joint nearest site of injury should be included.
- If the distal femur is the focus of attention, and the effects of the scatter are not of pressing concern, the image receptor can be placed directly under the femur.

➔ Femur-Lateral

Position of patient and image receptor

- From the antero-posterior position, the patient rotates onto the affected side and the knee is slightly flexed.
- The pelvis is rotated backwards to separate the thigh.
- The image receptor is positioned in the bucky tray under the lateral aspect of the thigh to include the knee joint and as much of the femur is positioned directly under the limb, against the lateral aspect of the thigh, to include the knee joint.

Direction and centering of x-ray Beam

- Center to the middle of the image receptor, with vertical central ray parallel to the imaginary line joining the femoral condyles.

Essential image characteristics

The image should show from the “knee up” to the proximal third of the femur.

Additional Considerations

- In some slim patients, it is possible to demonstrate up to the femoral head however, a separate image of this proximal region may be needed if the entire length of the femur is required to be seen.

➔ Radiological Findings

Antero-Posterior hip radiograph

- 1) Leg Length.
- 2) Neck-shaft angle.
- 3) Acetabular coverage: The lateral center-edge angle and femoral head extrusion index.
- 4) Acetabular depth.
- 5) Acetabular inclination.
- 6) Acetabular version.
- 7) Head sphericity.
- 8) Joint space width.

Lateral hip radiographs

The head-neck offset ratio can be assessed using three lines

- 1) A horizontal line
- 2) A line parallel to line1 through the anterior most aspect of the femoral neck.
- 3) A line parallel to line1 through the anterior most aspect of the femoral head.

Alpha angle can be measured more accurately using an

“Axial computed tomography” or “magnetic resonance imaging” A cam deformity is diagnosed if the alpha angle exceeds 50-50 degrees.

(Question No 2)

Explain the x-ray projection of chest and its radiologist consideration for it?

➡ X-ray Projection of chest

Chest - Postero - Anterior

Position of patient and image receptor

- The patient faces the image receptor, with the feet slightly apart for stability and chin extended and placed on the top of the of the image receptor
- The median sagittal plane is adjusted at right angle to the middle of the image receptor. The dorsal aspects of the hands are placed behind and below the hips, with the elbow brought forward and the shoulders rotated anteriorly and pressed downward in contact with the image receptor.
- For patients with reduced mobility an alternative is to allow the arms to mobility an alternative is to allow the arms to encircle the image receptor

Direction and Centering of x-ray Beam

- The horizontal central beam is directed at right angles to the image receptor at the level of the eight thoracic vertebrae (i-e, spinous process of T7 found by using the inferior angle of the scapula)
- Exposure is made in full normal arrested inspiration.
- An FRD of 180 cm should be used to minimize magnification.

Additional Consideration

- An expiration radiograph maybe obtained to demonstrate a small apical pneumothorax

➡ Chest-Lateral

Position of Patient and image receptor

- This projection maybe undertaken with or without a grid, depending on patient size and local protocols.
- The patient is turned to bring the side under investigation in contact with the image receptor.
- The median sagittal plane is adjusted parallel to the image receptor.
- The mid-axillary line is coincident with the middle of the image receptor, which is then is adjusted to include the apices and the lower lobes to the level of the first lumbar vertebra

Direction and centering of x-ray Beam

- Direct the horizontal central ray at right-angles to the middle of the image receptor at the mid-axillary line.

Additional Consideration

- The projection is useful to confirm position and size of a lesion suspected on the initial projection of the position of the leads post pacemaker insertion.
- However, it is not a routine examination because of the additional patient dose and the increasing use of computed tomography to examine the thorax.

(Question No 3)

Explain in detail basic projections for neck pain patients?

➡ Cervical Spine

Antero-Posterior C3-C7

Position of patient and image receptor

- The patient lies supine on the Bucky table or if erect positioning is preferred, sits or stand with the posterior aspect of the head and shoulders against the vertical Bucky.
- Median sagittal plane is adjusted to be at right-angle.
- The neck is extended (if the patient conditions allow) so that the lower part of the jaw is cleared from the upper cervical vertebra.

Direction and centering of x-ray Beam

- A 5-15 degree cranial angulation is employed, such that the inferior border of the symphysis menti is superimposed over the occipital bone.
- The beam is centered in the midline towards a point just below the prominence of the thyroid cartilage through the fifth cervical vertebra.

Essential image characteristic

- The image must demonstrate the third cervical vertebra down to the cervical-thoracic junction.
- Lateral collimation to soft tissue margins.
- The chin should be superimposed over the occipital bone.

➡ Cervical Spine-Lateral Erect

Position of patient and image Receptor

- The patient stands or sit with either shoulder against the image receptor.
- The median sagittal plane should be adjusted such that it is parallel with the image receptor.

Direction and centering of x-ray Beam

- The horizontal central ray is centered to a point vertically below the mastoid process at the level of the prominence of the thyroid cartilage.
- An FRD of 150 cm should be used to reduce magnification.

Essential Image Characteristic

- The whole of the cervical spine and upper part of TV1 should be included.
- The mandible or occipital bone should not obscure any part of the upper vertebra.
- Soft tissues of the neck should be included.

(Question No 4)

Write names for basic x-ray projections for Hand, Foot and Abdomen?

(A) Hand

➡ X-ray Projections

- (1) Hand-Dorsi-Palmer.
- (2) Hand-Dorsi-Palmar Oblique.
- (3) Hand-Lateral.

(B) Foot

➡ X-ray Projections

- (1) Foot-Dorsi-Plantar.
- (2) Foot-Dorsi-Plantar Oblique.
- (3) Foot-Lateral Erect.

(C) Abdomen

➡ X-ray Projection

- (1) Abdomen-Antero-Posterior Supine.
- (2) Abdomen-Prone.
- (3) Abdomen-Left Lateral Decubitus.