**MIDTERM**

**SUBJECT: RADIOLOGICAL POSITIONING**

**CLASS: 4rth SEMESTER**

**DEPARTMENT: RADIOLOGY (AHS)**

**TOTAL MARKS: 30**

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**Q NO1: Explain basic X-ray projections of Femur and discuss its radiological findings?**

**Ans1:**

**●FEMUR - ANTERO-POSTERIOR**

**■ Position of Patient and Image Receptor;**

**1.The patient lies supine on the X-ray table, with both legs extended.**

**2.The affected limb is rotated to centralize the patella over the**

**femur.**

**3.Sandbags are placed below the knee to help maintain the position.**

**4.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.**

**5.Alternatively, the image receptor is positioned directly under the**

**limb, against the posterior aspect of the thigh to include the knee**

**joint.**

**■ Direction and Centring of X-ray Beam:**

**Centre 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 included on the image where**

**possible.**

**■ Additional Considerations**

**1.In suspected fractures, the limb must not be rotated.**

**2.The knee and hip joints should be included on the image. If this**

**is impossible to achieve, then the joint nearest the site of injury**

**should be included.**

**3.If the distal femur is the focus of attention, and the effects of**

**scatter are not of pressing concern, the image receptor can be**

**placed directly under the femur.**

**●FEMUR - LATERAL**

**■Position of Patient and Image Receptor**

**1.From the antero-posterior position, the patient rotates onto the**

**affected side, and the knee is slightly flexed.**

**2.The pelvis is rotated backwards to separate the thighs.**

**The position of the limb is then adjusted to vertically superimpose**

**the femoral condyles.**

**3.Pads are used to support the opposite limb behind the one being**

**examined.**

**4.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 as possible.**

**5.Alternatively, the image receptor is positioned directly under the**

**limb, against the lateral aspect of the thigh, to include the knee**

**joint.**

**■ Direction and Centring of X-ray Beam**

**• Centre to the middle of the image receptor, with the 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**

**QNO2: Explain the X-ray projection of Chest and its radiological consideration for it?**

**Ans 2**

**●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 image**

**receptor.**

**• The median sagittal plane is adjusted at right-angles to the middle**

**of the image receptor. The dorsal aspects of the hands are placed**

**behind and below the hips, with the elbows 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 encircle the image receptor.**

**■Direction and Centring of X-ray Beam**

**• The horizontal central beam is directed at right-angles to the image**

**receptor at the level of the eighth thoracic vertebrae (i.e. spinous**

**process ofT7 — found by using the inferior angle of the scapula).**

**• Exposure is made in full normal arrested inspiration.**

**• An FRD of 180cm should be used to minimize magnification.**

**■Essential Image Characteristics**

**• Full lung fields with the scapulae projected laterally away from**

**the lung fields and clavicles symmetrical and equidistant from the**

**spmous processes.**

**• Sufficient inspiration — visualizing either six ribs anteriorly or**

**10 ribs posteriorly.**

**• The costophrenic angles, diaphragm, mediastinum, lung markings**

**and heart should be defined sharply.**

**■Additional Considerations**

**• An expiration radiograph may be obtained to demonstrate a small**

**apical pneumothorax.**

**●CHEST - LATERAL**

**■Position of Patient and Image Receptor**

**• This projection may be 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 arms are folded over the head or raised above the head to rest**

**on a horizontal bar.**

**• 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 Centring of X-ray Beam**

**• Direct the horizontal central ray at right-angles to the middle of**

**the image receptor at the mid-axillary line.**

**■Essential Image Characteristics**

**• The image should include the apices and costophrenic angles and**

**lung margins anteriorly and posteriorly.**

**• Image processing should be optimized to visualize the heart and**

**lung tissue, with particular regard to any lesions if appropriate.**

**■Additional Considerations**

**• The projection is useful to confirm position and size of a lesion**

**suspected on the initial projection or the position of 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.**

**●CHEST - ANTERO-POSTERIOR**

**(ERECT)**

**This projection is often used as an alternative when the postero-anterior**

**projection cannot be performed due to the patient's condition. Frequently**

**the patient is supported sitting erect on a chair.**

**■Position of Patient and Image Receptor**

**• The patient sits with their back against the image receptor, with**

**the upper edge of the image receptor above the lung apices.**

**• The median sagittal plane is adjusted at right-angles to the middle**

**of the image receptor.**

**• Dependent on the patient's condition, the arms are extended**

**forwards into the anatomical position and internally rotated to**

**minimize the superimposition of the scapulae on the lung fields.**

**■Direction and Centring of X-ray Beam**

**• The horizontal ray is directed first at right-angles to the image**

**receptor and towards the sternal notch.**

**• The central ray is then angled until it is coincident with the middle**

**of the image receptor. This has the effect of confining the radiation**

**field to the image receptor, avoiding unnecessary exposure of the**

**eyes.**

**• The exposure is taken on normal full inspiration.**

**• An FRD of at least 120cm is essential to reduce unequal**

**magnification of intrathoracic structures.**

**■Essential Image Characteristics**

**• The image should be of comparable quality to that described for**

**the postero-anterior chest projection.**

**■Additional Considerations**

**• The heart is moved further from the image receptor, thus**

**increasing magnification and reducing accuracy of assessment of**

**heart size (cardiothoracic ratio (CRT)).**

**●CHEST - SUPINE**

**(ANTERO-POSTERIOR)**

**This projection is usually only utilized when the patient is unable to sit**

**up on a bed or trolley.**

**■Position of Patient and Image Receptor**

**• With assistance, an image receptor is carefully positioned under the**

**patient's chest with the upper edge of the image receptor above**

**the lung apices.**

**• The median sagittal plane is adjusted at right-angles to the middle**

**of the image receptor.**

**• The arms are rotated laterally and supported by the side of the**

**trunk. The head is supported on a pillow, with the chin slightly**

**raised. The pelvis is checked for rotation.**

**■Direction and Centring of X-ray Beam**

**• As described for the sitting antero-posterior position (page 70).**

**■Essential Image Characteristics**

**• The image quality may be compromised due to the patient's**

**condition and the drawbacks of this technique; however, the apices,**

**lateral lung margins and bases should be visualized with optimum**

**image processing and resolution with no evidence of rotation.**

**■Additional Considerations**

**• Maximum lung demonstration is lost due to the absence of the**

**gravity effect of the abdominal organs, which is present in the erect**

**position.**

**• A pleural effusion or a pneumothorax is not as well demonstrated**

**compared with the erect projections.**

**• An FRD of at least 120cm is essential to reduce unequal**

**magnification of intrathoracic structures.**

**●CHEST - MOBILE/TROLLEY**

**(ANTERO-POSTERIOR)**

**Ward radiography should only be performed when necessary, by properly**

**justifying the examination and checking previous images for consistency.**

**■Position of Patient and Image Receptor**

**• Where possible, the patient should be examined in an erect position,**

**however this may not be achievable due to the patient's condition.**

**• The image receptor is supported behind the back of the patient,**

**using pads/pillows as required.**

**• It is very important to avoid/minimize any rotation, which can**

**make interpretation difficult.**

**Direction and Centring of X-ray Beam**

**As described for the sitting antero-posterior position (page 70).**

**■Essential Image Characteristics**

**• As described for the supine chest position (page 74).**

**■Additional Considerations**

**The radiographer needs to consider issues such as:**

**• careful identification of the patient**

**• moving and handling issues**

**• care when handling any patient devices such as drains or lines**

**• infection control**

**• radiation protection: use of lead rubber aprons; responsibility for**

**the controlled area and protecting patients via careful selection Of**

**exposure factors, collimation and lead backstops where necessary**

**• good communication with nursing staff**

**• it is good practice to annotate the image with information to**

**assist with consistency of results. This may include the date, time,**

**exposure, patient position and FRD.**

**QNO3: 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 Buck-y table or, if erect positioning is**

**preferred, sits or stands with the posterior aspect of the head and**

**shoulders against the vertical Bucky.**

**• The median sagittal plane is adjusted to be at right-angles to the**

**image receptor and to coincide with the midline of the table or**

**Bucky.**

**• The neck is extended (if the patient's condition will allow) so**

**that the lower part of the jaw is cleared from the upper cervical**

**vertebra.**

**• The image receptor/Bucky is positioned to coincide with the**

**central ray. The Bucky will require some cranial displacement if the**

**tube is angled.**

**■Direction and Centring of X-ray Beam**

**• A 5- to 15-degree cranial angulation is employed, such that the**

**inferior border of the symphysis menti is superimposed over the**

**occipital bone.**

**• The beam is centred in the midline towards a point just below**

**the prominence of the thyroid cartilage through the fifth cervical**

**vertebra.**

**■Essential Image Characteristics**

**• 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 sits with either shoulder against the image**

**receptor.**

**• The median sagittal plane should be adjusted such that it is parallel**

**with the image receptor.**

**• The head should be flexed or extended such that the angle of the**

**mandible is not superimposed over the upper anterior cervical**

**vertebra or the occipital bone does not obscure the posterior arch**

**of the atlas.**

**• To aid immobilization, the patient should stand with the feet**

**slightly apart and with the shoulder resting against the image**

**receptor stand.**

**• In order to demonstrate the lower cervical vertebra, the shoulders**

**should be depressed. This can be achieved by asking the patient**

**to relax their shoulders downwards. The process can be aided**

**by asking the patient to hold a weight in each hand (if they are**

**capable) and making the exposure on arrested expiration.**

**■Direction and Centring of X-ray Beam**

**• The horizontal central ray is centred to a point vertically below**

**the mastoid process at the level of the prominence of the thyroid**

**cartilage.**

**• An FRD of 150cm should be used to reduce magnification.**

**■Essential Image Characteristics**

**• The whole of the cervical spine and upper part of TVI should be**

**included.**

**• The mandible or occipital bone should not obscure any part of the**

**upper vertebra.**

**• Angles of the mandible and the lateral portions of the floor of the**

**posterior cranial fossa should be superimposed.**

**• Soft tissues of the neck should be included.**

**QNO.4 Write names for basic X-ray projections for the following.**

1. **Hand**

**• hand series**

**• PA view**

**• DP oblique view**

**• lateral view**

**• ball-catcher view**

**(Norgaard view)**

**• thumb series**

**• AP/PA view**

**• lateral view**

**• oblique view**

**fingers series**

**• lateral view**

**• oblique view**

1. **Foot**

**foot series**

**• oblique view**

**• lateral view**

**• weight-bearing view**

**• calcaneus series**

**• axial view**

**• lateral view**

**• toes series**

**• AP view**

**• oblique view**

1. **Abdomen**

**abdominal radiography**

**•acute abdominal series**

**•AP supine view**

**•PA erect view**

**•lateral decubitus view**

**•dorsal decubitus view**

**•PA prone view**

**•lateral view**

**•oblique views**

**upper limb radiography**

**•shoulder girdle radiography**

**• scapula series**

**•AP view**

**•lateral view**

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