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**DISCIPLINE...Bs radiology 4th**

**Paper...radiological positioning**

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**QUESTION NUMBER 4**

**Answer**

**Hand.**

The basic xray projection for hand is following.

1) Dorsi palmer

2) Hand dorsi palmer oblique

3) Hand lateral

4) PA view

5) Ball catcher view

**Foot.**

The basic xray projection for foot is following

**1)** Dorsi planter

2) Foot dorsi planter oblique

3) Foot lateral Erect

4) Weight bearing view

**Abdomen**

The basic xray projection for Abdomen is following.

1) Abdomen anterior posterior supine

2) Abdomen prone

3) Abdomen Left Lateral decubitus

4) oblique view

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**QUESTION NUMBER 1**

**Answer**

**Femur\_ Lateral**

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**Position of patient and Image Receptors**

* From the antero \_posterior,the patient rotate onto the effected affected side,and the knee is slightly flexed.
* The pelvis is rotated backwards to separate the thigh.
* The position of the limb is then adjusted to vertically superimposed the femoral condyle
* Pads are used to support the opposite limb behind the one being examined
* The image Receptors is position in the Bucky tray under the Lateral aspect of the thigh to include the knee joint and as much of the femur as possible.
* Alternatively ,the image Receptors is positioned directly under the limb,against the Lateral aspect of the thigh,to include the knee joint

**Direction** **and Centring of xray beam**

* Centre to the middle of the image Receptors with the vertical central ray parallel to the imaginary line joining the femoral condyle

**Essential Image Characteristics**

* The image should show from the knee up to the proximal third of the femur

**Additional Consideration**

* In some slim patient 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

**Femur \_ Antero- posterior**

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**Position of patient and image Receptors**

* The patient lie Supine on the xray table,,with both legs extended
* The effected limb is rotated to centralize the patella over the femur
* Alternatively the image Receptors is positioned directly under the limb,against the posterior aspect of the thigh to include the knee joint

**Direction** **and Centring of xray beam**

* Centre to the middle of the image Receptors ,with the vertical central ray at 90 degrees to an imaginary line joining both femoral condyle

**Essential Image Characteristics**

The hip and knee joint should both be include on the image where possible

**Additional Consideration**

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

In Lateral hip radiographs, the shape and upset of the femoral head neck junction as well as the offset alpha angle are assessed. The quantitative method used to measure femoral head neck junction morphology include the head neck offset ratio and the alpha angle,.the head neck offset ratio can be assessed using three lines

1) a horizontal lines

2) A line parallel to the line one through the anterior most aspect of the femoral neck

3) a line parallel to line 1 through the anterior most aspect of the femoral head

The head neck offset ratio is calculated by deviding the distance between line 2 and 3 by the diameter of the femoral head Although the alpha angle can be measured more accurately using on axial computed tomography or magnetic resonance imaging .it can also assessed with the use of Lateral radiographs by measuring the angle between a line connecting the centre of the long axis of the femoral neck and the centre of the femoral head.A can deformity is diagnosed if the alpha angle exceed 50-55

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**QUESTION NUMBER 2**

**ANSWER**

**Chest mobile (Antero posterior)**

**Position of patient and image Receptors**

* Where possible,the patient should be examined in an erect position, however this may not be achievable due to patient conditions
* The image Receptors is supported behind the back of the patients using pads/pillows are required
* It is very important to avoid/minimize any rotation make interpretation difficult.

**Direction and Centring xray Beam**

* **As** described for the Supine chest position

**Essential image Characteristics**

* As described for the Supine chest position

**Additional Consideration**

**The radiographs needed to consider issues such as.**

* Careful identification of the patient
* Moving and handling issues
* Infection control
* Care when handling any patient devices such as drain or line
* Good communication with nursing staff
* Radiation protection:use of leads rubber apron responsibility for the control area and protecting patient via careful selection of exposure factors, collimation any lead backstop where necessary
* 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

**CHEST LATERAL**

**Position of the patients and Image Receptors**

* Thisprojection may be under taken with or without a grid,depending on patient size and local protocol
* The patient is turned to bring the side under investigation in contact with the image Receptors. The mid axillary line is coincident with the middle of the image Receptors,which is then is adjusted to include the spices and the lower lobes to the level of the first lumbar vertebra
* The median digital plane is adjusted parallel to the image Receptors

**Direction and Centring of xray Beam**

Direct the horizontal central ray at right angle to the middle of the image Receptors at the mid-axillary line

**Essential image Characteristics**

* The image should include the apices and costophrenic angles and lung margins anteriorly and posterior
* Image processing should be optimised to visualise the heart and lung tissue,with particularly regard to any lesion if appropriate.

**Additional Consideration**

* 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)**

**Position of patient and image Receptors**

* The patient sits with their back against the image Receptors, with the upper edge of the image Receptors, above the lung apices.
* The median sagital plane is adjusted at right angle to the middle of the image Receptors
* Dependant on the patient conditions the arm are extended forward into the anatomical position and internal rotated to minimize the superimposed of the scapula on the lung field.

**Direction and Centring of xray**

* The horizontal ray is directed first at right angle to the image Receptors and toward the sternal notch
* The exposure is taken on normal full inspiration
* An **FRD** of at least 120 cm is essential to reduce unequal magnification of intra thoracic structures

**Essential image Characteristics**

The image should be of comparable quality to that described for the postero anterior chest projection

**Additional Consideration**

* The heart is moved further from the image receptor, thus increasing magnification and reducing accuracy of assessment of heart size

**CHECT\_ POSTERO-ANTERIOR**

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**Position of patient and image Receptors**

* The patient faces the image Receptors,with the feet slightly apart for stability and chin extended and placed on the top of the image Receptors
* The median sagital plane is adjusted at right angle to the middle of the image Receptors. The dorsal aspect of the hand are placed behind and below the hips,with the elbow brought forward and the should rotated anteriorly and pressed down ward in contact with the image Receptors.
* For patient with reduced mobility an alternative is to allow the arms to encircle the image Receptors.

**DIRECTION AND CENTRING OF XRAY**

* **The** horizontal central beam is directed at right angle to the image Receptors at the level of the eight thoracic vertebrae
* An exposure is taken on normal full inspiration
* An FRD of 180cm should be used to minimize magnification .

**Essential image Characteristics**

* Full lung field with the scapula projection laterally away from the lungs field and clavicle symmetrical and equidistant from the spinous process
* Sufficient inspiration\_ visualising either six ribs anteriorly or 10 ribs posteriorly
* The costophrenic angles, diaphragm, mediastinum ,lung markings and heart should be defined sharply

**Additional Consideration**

* An expiration radiographs may be obtained to demonstrate a small apical pneumothorax

**CHEST SUPINE( ANTERO posterior)**

**POSITION OF PATIENT AND IMAGE RECEPTORS**

* With assistance,an image Receptors is carefully positioned under the patient chest with the upper edge of the image Receptors above the lung apices
* The median saggital plane is adjusted at right angle to the middle of the image Receptors
* The arm 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 xray Beam**

* As described for sitting antero posterior position

**Essential image Characteristics**

* The image quality may be compromised due to the patient conditions and the drawback of this techniqu**e,**however the apices Lateral lung margins and bases should be visualized with optimum image processing and resolution with no evidence of rotation

**Additional Consideration**

* Maximum lung demonstration is lost due to the absence of the gravity effect of the abdominal organ, which is present in the erect position
* A pleural effusion or a pneumothorax is not as well demonstrated compared with the erect projection
* An FRD of at least 120 cm is essential to reduce unequal magnification of intra thoracic structures

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**QUESTION NUMBER 3**

**Answer**

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**CERVICAL SPINE \_ANTERO-POSTERIOR C3-C7**

* The patient lie Supine on the Bucky table or if erect positioning is preferred,sit or stand with the posterior aspect of the head and shoulders against the vertical Bucky
* The median saggital plane is adjusted to be at right angle to the image receptor and to coincide with the midline of the table or Bucky
* The neck is extended so that the lower part of the jaw is cleared from the upper cervical vertebra
* The image Receptors/Bucky is positioned to coincide with the central ray. The Bucky will require some cranial displacement if the tube is angle

**DIRECTION and Centring of xray**

* **A 5 to 15** degree cranial angulation is employed,such that the inferior border of the symphasis mentioned is superimposed over 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 mustdemonstratethe 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 RECEPTORS**

* The patient stands or sits with either shoulder against the image Receptors.
* The madian sagittal plane should be adjusted such that it is parallel with the image Receptors.
* 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 obscured the posterior arch of the atlas .
* To aid immobilization,the patient should start with the feet slightly apart and with the shoulder resting against the image Receptors stands.
* 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 xray 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 TV1 should be included.
* The mandible or occipital bone should not obscured 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 tissue of the neak should be included.