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**MIDTERM**

**SUBJECT: RADIOLOGICAL POSITIONING**

**CLASS: 4rth SEMESTER**

**DEPARTMENT: RADIOLOGY (AHS)**

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

**Ans : 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.

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

 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 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**

 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 the site of injury should be included.

**FUMER – 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 thighs.

 The position of the limb is then adjusted to vertically superimpose the femoral condyles.

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

 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.

**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 seen.

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

**Ans:**

**CHEST POSTERO INTERIOR**

**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.

**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 of T7 – found by using the inferior angle of the scapula).

 Exposure is made in full normal arrested inspiration.

**Essential Image Characteristics**

 Full lung fields with the scapulae projected laterally away from the lung fields and clavicles symmetrical and equidistant from the spinous 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 INTERO POSTERIOR (ERECT)**

**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.

**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 MOBILE/TROLLEY ( ANTERO POSTERIOR )**

**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.

 **Essential Image Characteristics**

As described for the supine chest position.

 **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?**

**Ans:**

**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 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 ANTERO POSTERIOR C1-C2 OPEN MOUTH**

**Position of Patient and Image Receptor**

 The patient lies supine on the Bucky 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 coincide with the midline of the image receptor, such that it is at right-angles to it.

The neck is extended, if possible, such that a line joining the tip of the mastoid process and the inferior border of the upper incisors is at right-angles to the image receptor. This will superimpose the upper incisors and the occipital bone, thus allowing clear visualization of the area of interest.

The image receptor is centred at the level of the mastoid process.

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

 Direct the perpendicular central ray along the midline to the centre of the open mouth.

 If the patient is unable to flex the neck and attain the position described above, then the beam must be angled, typically 5 to 10 degrees cranially or caudally, to superimpose the upper incisors on the occipital bone.

The image receptor position may have to be altered slightly to allow the image to be centred after beam angulation.

**Essential Image Characteristics**

The inferior border of the upper central incisors should be superimposed over the occipital bone.

 The whole of the articulation between the atlas and the axis must be demonstrated clearly.

 Ideally, the whole of the dens, the lateral masses of the atlas and as much of the axis as possible should be included within the image.

**CERVICAL SPINE LATERAL SUPINE**

**Position of Patient and Image Receptor**

This projection is normally undertaken on trauma patients who arrive in the supine position.

It is vitally important for the patient to depress the shoulders as much as possible (assuming no other injuries would contraindicate this).

 The receptor can be either supported vertically or placed in the erect receptor holder, with the top of the receptor at the same level as the top of the ear.

To further depress the shoulders, one or two suitably qualified individuals can apply caudal traction to the arms. NB: Refer to departmental local rules for staff working within a controlled area.

**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.

**Essential Image Characteristics**

 The whole of the cervical spine should be included, from the atlanto-occipital joints to the top of the first thoracic vertebra.

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

The contrast should produce a grey scale sufficient to demonstrate soft tissue and bony detail.

 Failure to demonstrate C7–T1: if othe patient’s shoulders are depressed fully, then the application of traction will normally show half to one extra vertebra inferiorly. Should the cervical thoracic junction still remain undemonstrated, then a swimmer’s lateral, oblique projection or CT should be considered.

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

**Ans :**

**Hand projection**

There are three projection used:

Posterior anterior

Lateral

Oblique

**Foot projection**

There are three projection used:

Anterior posterior

Lateral

Oblique

**Abdomen projection**

There are four projection used:

Anterior posterior

Lateral

Oblique

Posterior anterior