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Radiological Positioning

BS. Radiology

Atoofah Azmat

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(1)

Q1) what is dental OPG? Describe the Positioning and Patient Positioning technique in detail?

**Dental OPG :-**

OPG (Orthopantomogram) and Cephalogram are types of dental X-rays. An OPG Produces a Panoramic view of the jaw whilst a cephalogram is an x-ray of the facial structures.

**Position of Patient and Image Receptor :-**

- Any bulky clothing and radio opaque-objects, such as jewellery, dentures or hearing aids should be removed from the imaged area.
- The equipment is brought to the start position and careful explanation is given to the patient.
- A 15 x 30 cm image receptor is used on many machines, however, direct radiography (DR) technology may be utilized on newer equipment.
- The Patient walks into the machine, holding the handles and adopting a 'skiing' position.
- The head is tilted downwards until the

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Frankfort Plane is parallel with the floor and the machine height adjusted to allow the patient to bite into the bite block, with upper and lower incisors within the grooves. The chin should be placed on the rest.

→ Ensure the Patient is not rotated by ensuring the sagittal plane light runs down the middle of the face. Close the head restraints.

→ The Patient is asked to place their tongue on the roof of their mouth to reduce the air shadow and is asked to keep still for 20 sec.

→ The exposure is taken. Observe the patient carefully.

## Direction & Centring of X-ray Beam :-

→ The antero-posterior light should be centred distally to the upper lateral incisor. This allows optimal positioning of the 'focal through', the zone of focus outside of which the anatomical detail becomes blurred.

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## Essential Image Characteristics :-

- Correct anatomical coverage, which should include the entire maxillary and temporo-mandibular joints.
- Edge-to-edge incisors.
- No removable metallic foreign bodies.
- No evidence of movement unsharpness.
- No evidence of positioning errors, including rotation and errors within the occlusal plane (both external edges of the rami should be parallel to each other).
- The spinal shadow should be minimized.
- The air shadow at the roof of the mouth should be minimized if the tongue was placed correctly.

## Additional Considerations :-

- Problems can occur with producing an optimal image with this technique, due to a number of factors, including patient movement and positioning errors.

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QND2)

How will you scan a patient with lower back pain, write a basic view for lumbar X-rays?

**Lumbar X-ray :-**

An X-ray is a useful test for many conditions. It can help your doctor to understand the cause of chronic back pain or view the effects of injuries, disease, or infection. Your doctor may order a lumbar spine X-ray to diagnose:

- birth defects that affect the spine.
- injury or fractures to the lower spine.
- low back pain that's severe or last for more than four to eight weeks.
- Osteoarthritis, which is arthritis affecting the joints.

**Position of Patient & Image receptor :-**

- The patient lies supine on the bucky table, with the median sagittal plane coincident with, and at right angles to, the midline of the table and bucky.
- The antero-superior iliac spine should be equidistant from the tabletop.

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→ The hips and knees are flexed and the feet are placed with their plantar aspect on the tabletop to reduce the lumbar arch and bring the lumbar region of the vertebral column parallel with the image receptor.

→ The image receptor should be large enough to include the lower thoracic vertebrae and the sacro-iliac joints and is centered at the level of the lower costal ~~margin~~ margin.

→ The exposure should be made on arrested expiration allowing the diaphragm to move superiorly. The air within the lungs would otherwise cause a large difference in density and poor contrast between the upper and lower lumbar vertebrae.

## Direction & Centering of X-ray Beam :-

→ Direct the central ray towards the midline at the level of the lower costal margin (L3).

## Essential Image Characteristics :-

→ The image should include from T12 down to the bottom of the sacro-iliac joints.

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→ Rotation can be assessed by ensuring that the sacro-iliac joints are equidistant from the spine.

→ The exposure used should produce a density such that bony detail can be discerned throughout the region of interest.

Q No 3)

Patient of old age came in the department with a complaint of knee pain, what view should be done?

**Knee - Antero-Posterior:**

**Position of Patient & Image Receptor :-**

- For computed radiography (CR), an 18 x 24-cm image receptor is generally used.
- The patient is either supine or seated on the x-ray table, with both legs extended.
- The affected limb is rotated to centralize the patella between the femoral condyles, and sandbags are placed against the ankle to help maintain this position.
- The image receptor should be in close contact with the posterior aspect of the knee joint,

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with its centre level with the upper borders of the tibial condyles.

## Direction & Centering of X-ray Beam :-

→ Centre 2.5 cm below the apex of the patella through the joint space, with the central ray at 90 degrees to the long axis of the tibia.

## Essential Image Characteristics :-

→ The Patella must be centralized over the femur.

→ The distal third of femur and proximal third of tibia are included.

## Additional Consideration :-

→ This Projection can also be undertaken in the erect position (weight bearing).



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## Knee - Lateral :-

### Position of Patient & Image Receptor :-

- The Patient lies on the side to be examined, with the knee flexed at 45 or 90 degrees.
- The outer limb is brought forward in front of the one being examined and supported on a sandbag.
- A sandbag is placed under the ankle of the affected side to bring the long axis of the tibia parallel to the image receptor.
- The centre of the image receptor is placed level with the medial tibial condyle.

### Direction & Centering of X-ray beam :-

- Centre to the middle of the superior border of the medial tibial condyle, with the central ray at 90 degrees to the long axis of the tibia.

### Essential Image Characteristics :-

- The Patella should be projected clear of the femur.
- The femoral condyles should be superimposed.
- The proximal tibio-fibular joint is not clearly visible.

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QNO4)

A Patient fell from the bike after being hit by a car, has now complained of headache, what are the x-rays prescribed for a skull?

## Plain Skull X-ray :-

→ A Patient fell from the bike after being hit by a car, has now complained of headache, Plain skull X-ray are prescribe for a skull.

→ Headache and head trauma are common presenting problems in both primary care and the accident and emergency department.

→ Plain skull X-ray (SXP) films (Plain skull films) have largely been superseded by CT scanning or MRI scans in the context of both headaches and head injuries.

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Q5A)

How you see the importance of KVP and mAs setting in your X-ray machine?

Answer :-

→ Exposure factors influence and determines the quantity and quality of the X-ray radiation to which the patient is exposed.

⇒ The KVP and mAs are under the control of the operator except for those fixed by the design of the X-ray machine.

KVP :-

→ KVP controls the radiographic contrast.

→ KVP determines the ability for the beam to penetrate the tissue.

→ KVP has more effect than any other factor on image receptor exposure because it affects beam quality.

→ To a lesser extent it also influences the beam quality.

→ As we increase KVP, more of the beam penetrates the tissue with higher energy so they interact more by the Compton effect.

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- This Produces more scatter radiation which increases image noise and reduces contrast.
- 50 kV 79% is Photoelectric, 21% Compton, < 1% no interaction.
- 80 kV 46% is Photoelectric, 52% Compton, 2% no interaction.
- 110 kV 23% Photoelectric, 70% Compton, 7% no interaction.
- As no interaction increases, less exposure is needed to produce the image so patient exposure is decreased.

## mA-

- 1 Ampere = 1 C/s =  $6.3 \times 10^{18}$  electrons / second.
- The mA selected for the exposure determines the number of X-rays produced.
- The number of X-rays are directly Proportional to the mA assuming a fixed exposure time.
- 100 mA Produced half the X-ray that 200 mA would Produced.

QNO5B)

Write about the Positioning and technique of pelvic X-ray?

## Pelvis - Antero - Posterior -

### Position of Patient and Image receptor -

- The Patient lies supine with their median sagittal plane perpendicular to the table top.
- The midline of the Patient must coincide with the centred primary beam and table bucky mechanism.
- To avoid pelvic rotation, the anterior superior iliac supine must be equidistant from the tabletop.
- The limb are slightly abducted and internally rotated to bring the femoral necks parallel to the image receptor.

### Direction & Centering of X-ray beam :-

- Centre in the midline with a verticle central beam to the centre of the image receptor.

## Essential Image Characteristics :-

- iliac crests and proximal femora, including the lesser trochanters, should be visible on the image.
- No rotation. The iliac bones and obturator foramina should be the same size and shape.

## Additional Characteration :-

- At first visit and trauma cases, gonade protection is usually omitted, however local protocols can vary. It is used on follow-up images.

THE END