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BS: Radiology

Final Exam

Paper: Radiological Positioning
and Clinical Practice

Date: 23-June-2020

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Question 1.

What is dental OPG? Describe the positioning and patient positioning technique in detail?

OPG:-

OPG means orthopantomography

Patient Position:-

- ⇒ 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

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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 "skind" position.

⇒ The head is tilted downwards until the 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 groove. The chin should be placed on the Rest.

⇒ Ensure the patient is not rotated by ensuring the sagittal plane light runs down the midline of the face. Close the head Restraints.

⇒ The patient is asked to place their tongue on the roof to their mouth to reduce the

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the cir shadow and is asked to keep still for 20 seconds.

⇒ The exposure is taken. observe the patient carefully.

Used For OPG:-

An OPG is a panoramic x-ray of the upper and lower jaws including the teeth. The OPG unit is specifically designed to rotate around the patient's head during the scan. An OPG will take approximately 20 seconds. it can also be used for surgical planning.

Technique:-

This technique creates a panoramic image the should include the lower limits of the mandible, the upper limits of the maxillary sinuses, and the mandibular condyles and temporomandibular joints laterally. panoramic image limitations include inherent anatomy distortion, double image

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"ghost image" and do not provide a spatial relationship between structure.

Patient Position

During an OPG the patient remains in a stationary position (seated or standing) while both the x-ray source and film rotate in combination around the patient. The x-ray source rotates from one side of the jaw, around the front of the patient, and then to the other side of the jaw. The film rotates opposite to the x-ray source behind the patient. It takes a few seconds during which the patient must remain completely still.

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Question 2:-

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

⇒ MRI and CT Scan is best scan for back pain.

The MRI is a best scan for back pain was developed in the 1980's and has revolutionized treatment for patients with low back pain. An MRI scan is generally considered to be the single best imaging study of the spine to help plan treatment for back pain.

⇒ If someone is experiencing pain in their lower back, a doctor may recommend a lumbar MRI scan to help diagnose the source of the pain. A doctor may also order a lumbar MRI for a person who is about to undergo back surgery. A lumbar MRI is a powerful diagnostic tool that doctors may use to check spinal alignments.

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Basic view for Lumbar Spine:-

Lumbar Spine (AP/PA) view:-

⇒ Lumbar Spine AP view images the lumbar spine which consists of five vertebrae. It is utilised in many imaging contexts including trauma, postoperatively, and for chronic conditions.

Patient Position:-

- ⇒ The patient is erect or supine depending on clinical history.
- ideally, spinal imaging should be taken erect in the setting of non-trauma to give a functional overview of the lumbar spine.
 - All imaging of patients with suspected spinal injury must occur in the supine position without moving the patient.
 - In the supine projection hands are placed by the patient's side.
 - If performing erect, position the patient in the PA position, this has numerous advantages including reduced dose to the

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gonadal Region and utilisation of beam divergence, arm can be placed by the side, or the handlebars of the erect bucky can be held for patient stability.

Technical Factors:-

- ⇒ Anteroposterior projection
- ⇒ Suspended expiration
- ⇒ Centring point
- ⇒ Collimation
- ⇒ orientation → Portrait
- ⇒ Detector → Size 35cm x 43cm
- ⇒ Exposure → 70-81kvp / 40-6mAs
- ⇒ SID → 110cm
- = Grid

Direction and Centring of x-ray beams:-

- ⇒ Direct the Central ray towards the midline at the level of the lower costal margin.

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.

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Question 3:-

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

Position of Patient and 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, with its centre level with the upper border of the tibial condyles.

Direction and Centring of x-ray beams

- ⇒ Centre 2.5cm below the apex of the patella through the joint space, with the central ray at 90 degree to the + long axis of the tibia.

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Essential image Characteristics:-

- ⇒ The patella must be centralized over the femur.
- ⇒ The distal third of femur and proximal third of tibia are included.

Additional Considerations:-

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

Knee Lateral:-

Patient Position:-

- ⇒ The patient lies on the side to be examined, with

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the knee flexed at 45 or 90 degrees.

⇒ The other 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 position of the limb is now adjusted to ensure that the femoral condyles are superimposed vertically.

⇒ The centre of the image receptor is placed level with the medial tibial condyles.

Direction and Centring of x-ray Beam:-

⇒ Centre to the middle of the superior border of the medial tibial condyles, with the central ray at 90 degree 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.

Additional Considerations:-

- ⇒ A 3- to 5° degree cranial tube angulation can sometimes help superimpose the femoral condyles.
- ⇒ over-Rotation = Fibula is projected too posteriorly.
- ⇒ under-Rotation = Fibula head is hidden behind tibia.
- ⇒ Identification of the adductor tubercle indicates the medial femoral condyles and can assist the Radiographer to correct positioning faults.

Question 4:-

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?

CT Scan and MRI is the best scan for headache.

CT Scan:-

A CT Scan uses x-rays and computers to make images of the body. It can sometimes help doctors diagnose headaches and their causes. You might need one if you have headache daily or almost every day or have a sudden onset severe headache. Doctors can't diagnose migraines with the test, though.

⇒ Both the CT scan uses x-ray technology to create cross-section images of the body's

interior. A CT scan show high quality scans and is often used to check for any bleeding in the brain.

MRI:-

MRI (magnetic Resonance imaging) creates image through magnetised Radio waves. The MRI can often provide a greater detail to images, Brain MRI may be selected to assess development abnormalities, blood vessel issues, eye and inner ear conditions, and chronic nervous system disorder such as multiple Sclerosis.

Both scan are effective such as multiple and produce superb imagery, making them incredibly useful in the process of diagnosis.

- It is important to Remember that a brain scan such as a MRI and CT scan is not necessarily an indicator of a serious problem but a precaution taken a your health.

An MRI can't diagnose migraines, cluster, or tension headaches, but it can help doctors rule out other medical conditions that may cause your symptoms, such as

A brain tumor.

An infection in your brain, called an abscess.
The buildup of fluid in the brain called hydrocephalus.

Both kinds of headaches can be very painful, but a CT scan or MRI rarely show why the headache occurs, having a CT scan or MRI also does not help ease the pain. A health care provider can diagnose most headaches during an office visit. The health care provider asks you questions about your health and your symptoms.

Question 5:-

How you see the importance of kVp and MAS settings in your x-ray machine?

⇒ The MAS (milliampere seconds) determines the number of x-rays produced per unit time and the number of x-rays reaching the film determines the degree of blackening of the film. The type of film or screen system being used --- increasing kVp increases the penetrating power of the x-ray beam.

What Does kVp control in x-rays:-

kVp controls the property called "Radiographic Contrast" of an x-ray image (the ratio of transmitted radiation through regions of different thickness or density). Each body part

Contains a certain type of cellular composition which requires an x-ray beam with a certain kVp to penetrate it.

How Does kVp and MAS affect image quality:-

The first experiment showed that, when the film density is kept constant, the higher the kVp, the lower the Resolution and image Contrast percentage also, the higher the MAS, the higher the Resolution and image Contrast percentage.

Relationship between kVp and MAS:-

The more mass you are going through the higher the MA will be. kVp, or kilovoltage peak, is the difference in voltage between the

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Cathode and the anode in the x-ray tube. The higher the kVp, the more 'penetrating' will the x-rays be. Thicker body parts require higher kVp. However, higher kVp creates more Scatter Radiation.

(b) Part

write about the positioning and technique of pelvic x-rays?

Pelvic (AP view):-

The AP pelvic view is part of a pelvic series examining the iliac crest, sacrum, proximal femur, pubis, ischium and the great pelvic ring. It is of considerable importance in the management of severely injured patients presenting to emergency department.

Patient Position:-

- patient is supine
- lower limbs are internally rotated $15-25^\circ$ from the hip (do not attempt this if a fracture is suspected).

Technical Factors:-

- ⇒ AP projection
- Centring Point
the midpoint

of the anterior Superior iliac spine and the pubic Symphysis

- Collimation
 - laterally to the skin margins
 - Superior to above the iliac crests
 - inferior to the proximal third of the femur
- Detector Size
 - 35cm x 43cm
- Exposure
 - 70-80 kVp
 - 20-30 mAs
- SID
 - 100cm

Technique:-

- Entirely of the bony pelvis is imaged from Superior of the iliac crest to the proximal shaft of the femur.
- obturator foramina appear equal
- iliac wings have an equal concavity
- Greater trochanter of the proximal femur are in profile

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 Considerations:-

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