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B.S Radiology 4th Semester

Subject: Radiological Positioning

Question No: 1

What is dental OPG? Describe the Positioning and Patient Positioning technique in detail?

* Dental X-ray OPGs

OPG (Orthopantomogram) are type of dental X-rays. An OPG Produces a panoramic view of the jaw whilst a cephalogram is an X-ray of the facial structures. A lateral cephalogram Produces a side Profile image of the face, jaws and soft tissues to assess the relation of the teeth to the jaws, the jaws to the skull and the relation of the soft tissues to the teeth and jaws. OPGs are commonly used during a general dental check up, but can also be conducted to monitor and diagnose.

- Teeth (general review)
- Teeth (cavities)
- Teeth impaction
- Fractures

- Dislocation
- Infection
- Tumours
- Sinuses

* Positioning and Patient Positioning technique:

- Chair and Patient Positions are important consideration. Modern dental chairs are designed to provide total Body support in any chair Position.
- Chair Position is a very important aspect in the success of a dental treatment.
- Efficient patient and operator Positions are beneficial for the welfare of both.
- The dental chair should support the Patient's Head, Back and Arms.

* Supine Position:

- In this Position, the chair is tilted so that the patient is almost in a lying down Posture.
- The Patient's Head, knee and feet are approximately at the same level; However, The Head should not be positioned lower than the feet except when the Patient is in

Reclined 45 Degrees

In this position, the chair is reclined at 45 degrees. So that when the Patient is seated, the Mandibular occlusal surfaces are almost 45 degrees of the floor

Right handed operators

Right front position (7-0'clock)

Right position (9-0'clock)

Right Rear position (11-0'clock)

Direct Rear position (12-0'clock)

Left handed operators

Left front (5-0'clock)

Left (3-0'clock)

Left Rear (1-0'clock)

Right Front Positions

This is the convenient for examination and working on the mandibular anterior teeth, Mandibular right posterior teeth and Maxillary anterior teeth.

For added ease, the Patient's head may be slightly turned towards the Dentist.

2 Right Position

The operator is directly to the right of the patient. This position is convenient for operating on the facial surfaces of the maxillary and mandibular right posterior teeth and occlusal surfaces of the mandibular right posterior teeth. 9-0° clock position.

3 Right Rear Position

→ This is the preferred position for most procedures. From this position the dentist can have good access to most areas of the mouth using direct or indirect vision.

→ The dentist sits to the right and slightly behind the patient and the left arm is positioned around the patient's head.

→ This position is also referred to as the operating system.

→ In this position working on the lingual surfaces of maxillary anterior teeth is most convenient.

→ Direct vision may also be used on the mandibular teeth, particularly on the left side.

4 Direct Reax Positions-

- This Position has limited application.
- This position is mainly used only for working on the lingual surfaces of mandibular anterior teeth.
- It can also be used while working on the lingual surfaces of maxillary anterior teeth.

* Patient Standing/Sitting Positions

- If patient is able to stand, have them stand erect without the spine being slumped.
- If patient is seated, they should sit as upright as possible.
- It help to do a test run with the panoramic machine to make sure it will not hit the patient's shoulders.

* Patient Mouth Positions

- Patients need to place maxillary/mandibular incisors correctly on bite block in order to achieve proper alignment of the teeth.
- Most units have a notch in the bite block indicating the proper location for the patient to bite.

★ Patient Midsagittal Plane Position:

→ The patient's head must be straight and not tilted.

→ The midsagittal plane must be kept perpendicular to the floor.

★ Frankfort Planes

→ Keep the Frankfort plane parallel with the floor.

★ Tongue Position:

→ Instruct the patient to place their entire tongue on the hard plate and leave it there for the duration of the exposure.

★ Lips Position:

Instruct patient to keep their lips together for the duration of the exposure.

Question No: 2

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

* Lower Back Pain:-

Lower back pain defined as pain and discomfort, localized below the costal margin and above the inferior gluteal folds, with or without referred leg pain while chronic low back pain is defined as low back pain persisting for at least 12 weeks.

* Patient Risk factors:

The most frequently reported are heavy physical work, frequent bending, twisting, lifting, pulling and pushing, repetitive work, static postures and vibrations. Psychosocial risk factors include stress, distress, anxiety, depression and mental stress, heavy lifting, driving motor vehicles, jogging, weaker trunk strength, obesity, pregnancy,

* Scan a patient with lower back pain:-
We ask from the patient that how your pain is acute or chronic.

Active low back pain is usually self-limiting (recovery rate 90% within 6 weeks) but 2-7% of people develop chronic pain. Recurrent and chronic pain account for 75 to 85% of total workers' absenteeism.

→ When the patient's pain is chronic then we ask, "What is the cause or not?" When the patient has any cause of the lower back pain, that cause pain in the lower back.

★ Causes of low back pain:

- apophyseal osteoarthritis
- degenerative disc spinal
- disc herniation
- spinal stenosis
- spondylo listhesis
- and other congenital abnormalities, fracture, ligamentous strains or sprains.

★ Diagnosis or test for patients

When we give a test to the patient, when we see what is the main problem of the patient's lower back pain.

Perform diagnostic imaging in lower back Pain to Patient are

X-ray

MRI

CT-Scan

Bone-Scan

Patient education to avoid any strain for back as heavy lifting.

Basic view of Lumbex spine X-rays:

Antero-Posterior Views:

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 anterior superior iliac spines should be equidistant from the tabletop.

The hip 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 joint and is centred at the level

of the lower costal margin.

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

* **Direction and Centring of X-ray Beams:**
Direct the central ray towards the midline at the level of the lower costal margin.

* **Essential Images:**

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

→ 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.

2 Lateral Views

- The patient lies on their side on the Bucky table. If there is any degree of scoliosis, then the most appropriate lateral position will be such that the concavity of the curve is towards the X-ray tube.
- The arm should be raised and resting on the pillow in front of the patient's head. The knee and hips are flexed for stability.
- The coronal plane running through the centre of the spine should coincide with, and be perpendicular to the midline of the Bucky.
- The image centred at the level of the lower costal margin.
- This projection can be undertaken erect with the patient standing or sitting.

* Direction and Centring of X-ray Beam:
Direct the central ray at right-angles to the line of spinous processes and a point 7.5 cm anterior to the third lumbar spinous process at the level of the lower costal margin.

Essential Images

The image should T12 downwards
the lumbar sacral junction.

Ideally, the projection will produce
a clear view through the centre
of the intervertebral disc spaces,
vertebral endplates superimposed,

The cortices at the posterior
and anterior margins of the
vertebral body should also be
superimposed.

Image factor selected produce an
image density sufficient for
diagnosis from T12 to L5/S1, the
spinous processes.

Question No. 3

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

Ans Knee Pain:

Knee Pain is a common complaint that affects people of old age. Knee Pain may be the result of an injury, such as a ruptured ligament or torn cartilage. Medical conditions - including arthritis, gout and infections also can cause knee pain.

* Diagnosis:

During the physical exam, your doctor will do:

- Inspect your knee for swelling, pain, tenderness, warmth and visible bruising.
- Check to see how far you can move your lower leg in different directions.
- Push on or pull the joint to evaluate the integrity of the structures in your knee.

* Imaging tests for treatments:

In some cases, we suggest tests such as:

• X-rays

Your doctor may first recommend having an X-ray, which can help detect bone fractures and degenerative joint disease.

• Computerized tomography (CT) scans.

CT scanners combine X-rays taken from many different angles to create cross-sectional images of the inside of your body. CT scans can help diagnose bone problems and subtle fractures. A special kind of CT scan can accurately identify gout even when the joint is not inflamed.

• Magnetic resonance imaging (MRI).

An MRI uses radio waves and a powerful magnet to create 3D images of the inside of your knee. This test is particularly useful in revealing injuries to soft tissues such as ligaments, tendons, cartilage and muscles.

• Ultrasounds

This technology uses sound waves to produce real-time images of the soft tissue structures within and around your knee. ~~For~~ when we may want to move your knee into different position during the ultrasound to check for specific problems.

Question No: 4

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

* Headaches

A Headache is an injury to the brain, skull, or scalp. It can be hard to assess the severity of the injury just by looking. Minor head injuries bleed a lot, while some major injuries don't bleed at all. It's important to treat all head injuries all headache seriously and get them assessed by a doctor.

→ Two Main X-ray Provide for the Skull.

1 Computerized tomography (CT) scans
This test is usually the first performed in an emergency room for a suspected traumatic brain injury. A CT scan uses a series of X-ray to create a detailed view of the brain. A CT scan quickly visualize fractures and uncover evidence of bleeding in the brain (hemorrhage), blood clots (hematomas), bruised brain tissue (contusions), and brain tissue swelling.

2 Magnetic resonance imaging (MRI)
An MRI uses powerful radio waves and magnets to create a detailed view of the brain. This test may be used after the person's ~~can~~ condition stabilizes or if symptoms don't improve soon after the injury.

Question No: 5

A) How you see the importance of kVp and MAS settings in your X-ray machine.

* KVP setting X-ray Machine-

→ KVP controls screen-film radiographic contrast. A higher quality X-ray beam is one with higher energy that is more likely to penetrate the anatomy of interest and make it to the image receptor. Each body part contains a certain type of cellular composition which requires an X-ray beam with a certain kVp to penetrate it. The kVp selected help to the number of X-ray in the image-forming beam, and the resulting average optical density.

→ The kVp controls the scale of contrast of the finished radiograph because as kVp increases less differential absorption occurs. High kVp results in reduced image contrast.

* MAS Setting 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 being used. Increasing kVp increases the penetrating power of the x-ray beam. The first experiment show that, when the film density is kept constant the higher the mAs, the higher the resolution and image contrast percentage.

B) Write about the positioning and technique of Pelvic x-rays?

* Antero-Posterior Positioning:

- 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 spines must be equidistant from the table top.
- The limbs are slightly abducted and internally rotated to bring the femoral necks parallel to the image receptor.

Technique of Pelvic X-rays

AP Projection

Centering Points: The midpoint of the anterior superior iliac spine and the pubic symphysis

collimations

laterally to the skin margins

superior to above the iliac crests

Inferior to the proximal third of the femur

orientation &

landscape

detector size

35cm x 43cm

exposure:

70-80 kVp

20-30 mAs

SID:

100cm

grid:

Yes

Image technical evaluations

obturator foramina appear equal

iliac wings have an equal concavity
greater trochanters of the proximal femur are in profile.

entirety of the bony pelvis is image from superior of the iliac crest to proximal shaft.