Sri Aurobindo College of Dentistry
Indore, Madhya Pradesh
INDIA
MODULE PLAN

• TOPIC : Extra oral radiography

• SUBJECT: OMDR

• TARGET GROUP: UNDERGRADUATE DENTISTRY

• MODE: POWERPOINT – WEBINAR

• PLATFORM: INSTITUTIONAL LMS

• PRESENTER: DR. MAYURI JAITLY
Extra oral radiography

PRESENTED BY DR. MAYURI JAITLY (M.D.S)
Indication

1. Trismus.
2. Large lesions.
3. When jaws and other facial bones have to be examined for evidence of disease lesions and other pathological conditions.
Indication

4. To evaluate skeletal growth and development.
5. To evaluate status of impacted teeth.
6. To evaluate TMJ area.
7. To evaluate trauma.
Landmarks in extraoral radiography

- **Canthomeatal line**
- **Frankfurt plane**
- **Mid sagittal plane**
Requirement of equipment

X ray unit

Panaromic X ray unit.

Intra oral X ray machine

Extra oral X ray machine
- Extraoral non screen films
- Extraoral screen films:
  I. Sensitive to blue light
  II. Sensitive to green light
- OPG films.

- Intensifying screen:-
  I. Blue light
  II. Green light

- Film cassettes:-
- Grids
Various extra oral radiograph
Radiograph for maxillary sinus:
1. Standard occiputomental projection 0 degree
2. 30 degree occiputomental projection.
3. PA waters

Radiography for mandible:-
1. PA mandible.
2. Rotated PA mandible.
3. Lateral oblique:-
   (i) Anterior body of mandible.
   (ii) Posterior body of mandible.
   (iii) Ramus of mandible.
• **Radiography of base of skull.**
  (i) Submentovertex projection.

• **Radiography for zygomatic arch:**
  (i) Jug handle view

• **Radiography of Temporomandibular joint:**
  (i) Transcranial projection.
  (ii) Transpharyngeal projection.
  (iii) Transorbital projection.
  (iv) Reverse Townes projection
Lateral oblique projections of mandible
Lateral oblique projections of mandible

1. Lateral oblique body of mandible
2. Lateral oblique ramus of mandible.
Lateral oblique body of mandible
Lateral oblique body of mandible

- **Head position:** The head is tilted toward the side to be examined with mandible protruded.
- **Film placement:** The cassette is placed against the patient's cheek and centered over the first molar. The lower border of the cassette should be parallel to the inferior border of the mandible and extend at least 2 cm below it. The cassette is held in place by the patient.
• **Projection of central ray:**

The central ray is directed towards the first molar region of the mandibular body to be examined from a point 2 cms below the angle of mandible on tube side. The central rays are kept as close perpendicular to the cassette.
Lateral oblique body of mandible

- Maxillary sinus
- Inferior alveolar canal
- Inferior border of mandible
- Vertebrae
- Mental foramen
Lateral oblique ramus of mandible.
Lateral oblique ramus of mandible.

- **Head position:**
  - The head is tilted toward the side of the mandible to be examined until a line between the angle of mandible next to the tube and the condyle on the side away from the tube is parallel to the floor.
  - The mandible is protruded to prevent the cervical spine from superimposed over the ramus.
**Film placement**: the cassette is placed over the ramus of the mandible and far enough posterior to include the condyle. The lower border of cassette should be parallel to inferior border of mandible and extend 2 cms below the inferior border of mandible.

**Projection of central ray**: the central ray is directed posterior towards the center of ramus on the side of interest from a point 2 cms below the inferior border of first molar region of mandible on the tube side.
Lateral oblique ramus of mandible.

Condyle
Mandibular foramen
Hyoid bone
Inferior alveolar canal
External oblique ridge
Coronoid process
Difference in projection
Posterior anterior of skull (PA skull)
Posterio- anterior of skull (PA skull)
Posterior anterior of skull (PA skull)

Main indications

1. Fracture of skull vault.
2. Investigation of frontal sinus.
3. Condition affecting the cranium, particularly
   • Pagets’s disease
   • Multiple myeloma
   • Hyperparathyroidism
4. Intracranial calcification
Technique and positioning

- The patient is positioned facing the film with the head tipped forwards so that the forehead and tip of nose touch the film. The so called forehead nose position.
- This positioning of the base of the skull allows the vault to be seen without superimposition.
• The x ray tube head is positioned with the central rays horizontal ($0^0$) centered through the occiput
Maxillary antrum

Frontal sinus

Ethmoid sinus

Nasal septum

Coronoid process

Maxillary antrum

Inferior border of mandible
Postero anterior of jaws
( PA jaws/ PA mandible)
1. Fracture of the mandible involving the following sites
   - Posterior third of the body
   - Angles
   - Rami
   - Low condylar necks
2. Lesions such as cyst or tumor in the posterior third of the body or rami to note any medio lateral expansion
3. Mandibular hypoplasia and hyperplasia.
4. Maxillofacial deformities.
Technique and positioning

The patient is positioned facing the film with the head tipped forwards so that the forehead and tip of nose touch the film. The so called forehead nose position.

The x ray tube head is again horizontal, but now the central ray is centered through the cervical spine at level of the rami of the mandible.
Waters projection
Occiputomental projection
Waters projection
Waters projection
Occiputomental projection

Main indications

- Particularly useful in evaluating maxillary sinuses.
- In addition it demonstrates frontal and ethmoidal sinus, the orbit, the frontozygomatic suture and nasal cavity.
• **Head position:** the head is placed with sagittal plane perpendicular to the plane of the film. The chin is raised high so that canthomeatal line is elevated 37 degree above the horizontal.

• **Projection of central rays:** the central rays are projected perpendicular to the film, through the mid sagittal plane and at the level of sinus.

• **Exposure parameter:** kvp 75-80
Waters projection
Waters projection

- Orbit
- Zygomatic arch
- Lower border of mandible
- Frontal sinus
- Nasal septum
- Maxillary sinus
- Coronoid
- Odontoid process
Submentovertex
‘Full axial projection’
Submentovertex
‘Full axial projection’

Main indications

• To demonstrate base of skull
• To reveal position and orientation of condyles.
• The sphenoid sinus, the curvature of mandible.
• The lateral wall of maxillary sinus.
• Displacement of fractured zygomatic arch.
• Medial and lateral pterygoid plates fractures
Submentovertex projection
Film placement

- The film cassette is placed vertically in a holding device. A grid should be used.

Head position:

The patient's head and neck is hyper extended backward as far as possible and the vertex of the skull is placed on the center of cassette. The mid sagittal plane is kept perpendicular to the floor. The canthomeatal line should extend 10 degrees past vertical so that the Frankfurt line is oriented vertically and parallel to the film.
**Projection of central rays**

- The central rays are directed from below the mandible upward toward the vertex of the skull.
- It is positioned far enough anterior to pass about 2 cms in front of line connecting the right and left condyloid process.

**Exposure parameter**

- kVp 75-80.
Submentovertex
Jug handle view
Submentovertex

Zygomatic arch
Reverse Towne’s
Reverse Towne’s

Main indications

1. Fracture of condylar necks.
2. Intracapsular fractures of TMJ.
3. Investigation of the quality of the articular surfaces of the condylar heads in TMJ disorder.
4. Condylar hypoplasia and hyperplasia
Technique and positioning

• The patient is in PA position
• The mouth is kept open. This opening of mouth takes the condyle head out of the glenoid fossa so they are seen.
• The x ray tube head is aimed upwards from below the occipit, with the central ray at $30^\circ$ to the horizontal, centered through the condyles.
Panoromic radiograph
Panoromic radiograph

Main indications

• The evaluation of trauma, third molars, extensive and unique prosthesis and their surgical procedure.
• The evaluation of tooth development, especially mixed dentition analysis.
• The evaluation of developmental anomalies.
Advantages

• The broad anatomic region viewed
• The relative low patient radiation dose.
• The relative convenience, ease and speed with which the procedure may be performed.
• The fact that the procedure may be performed on patients who are unable to open their mouth.
Disadvantages

• The resultant image does not resolve the fine anatomic details that may be seen in IOPA.
• Other problems associated with panoramic radiography are magnification, geometric distortion and overlapped images teeth, especially in the premolar region.
• The cost.
Inferior alveolar canal
Hyoid bone
Zygomatic arch
Maxillary sinus
Cephalometric Radiography
Cephalometric Radiography
Cephalometric Radiography

Main indications

• Initial diagnosis: confirmation of the underlying skeletal and/or soft tissue abnormalities.
• Treatment planning.
• Monitoring treatment progress.
• Appraisal of treatment result.
Technique and positioning

- The patient is positioned within the cephalostat, with the sagital plane of the head vertical and parallel to the film and with the Frankfort plane horizontal.
- The teeth should be in maximum intercuspation.
- The head is immobilized carefully within the apparatus with the plastic ear rods being inserted gradually into the external auditory meatus.
• The distance between X ray source and the midsaggital plane is 60 inches. The central rays is directed towards the external auditory meatus and perpendicular to the plane of the film and the midsaggital plane

• **Exposure parameters:** kVp 75-80
Lateral Cephalogram

- Frontal sinus
- Orbit
- Maxillary sinus
- Hard palate
Pituitary fossa
Frontal bone
Pituitary fossa
Soft tissue shadow
Vertebrae
Mastoid air cells
Nasal bone
Sphenoid sinus
Mastoid air cells
Temperomandibular joint radiograph
Trans caranial projection
Main indications

- TMJ pain dysfunction syndrome and internal disarrangements of joint producing pain clicking and limitation of opening.
- To investigate the size and position of the disc-
- To investigate range of movement.
**Technique and positioning**

- The x ray film cassette is positioned against the facial skin surface on the side of interest, parallel to the sagittal plane.

- The x rays are directed from contralateral side projected downwards 25 degree and anteriorly 20 degree and is centered on TMJ.

  - Closed position
  - Open mouth position
**Advantage**

- Helpful in detecting changes in the lateral aspect of the articulating surfaces such as those produced by various forms of arthritis.
- Closed mouth position provide approximate position of condyle in glenoid fossa.
Trans caranial projection
Trans caranial projection

Closed mouth

Open mouth
Trans pharyngeal projection
Parma, Mcqueen projection
Trans pharyngeal projection

Main indications

- TMJ pain syndrome.
- To investigate the presence of joint disease particularly osteoarthritis and rheumatoid arthritis.
- To investigate pathological conditions affecting the condylar head including cyst and tumor.
- Fracture of neck and head of condyle
Technique and positioning

- The patient holds the cassette against the side of the face over TMJ of interest. The film is parallel to sagittal plane.
- The patient’s mouth is open.
- The X-ray tube head is positioned in front of the opposite condyle and beneath the zygomatic arch. It is aimed through the sigmoid notch, slightly posteriorly across the pharynx at the condyle under investigation.
Trans pharyngeal projection
Trans pharyngeal projection

External auditory meatus
Condylar process
Styloid process
Transorbital projection
Transorbital projection
Transorbital projection
Zimmer projection

• The patient is upright and tip the head downwards about 10 degree, so canthomeatal line is horizontal. Place the tube head in front of the patient and direct the central rays through ipsilateral orbit and through TMJ of interest, existing from the skull behind mastoid process.

• The x ray film is placed behind patients head so the central ray is projected to its center and perpendicular to it.

• Patient is asked to open mouth as wide as possible.
Advantage

• It demonstrate the convex articulating surface of the condyle and slight concave or flat, broad ridge of the articular eminnence.

• It can show mesio distal displacement of fractured condyle.
Transorbital projection

- Orbit
- Condyle head
Standard occipitomental
($0^0$ OM)
Standard occipitomental (0° OM)

Main indications

1. Investigation of maxillary antrum.
2. Detecting the following middle third facial fracture
   - Le Fort I
   - Le Fort II
   - Le Fort III
3. Zygomatic complex
4. Nasoethmoidal fracture
5. Orbital blow out.
7. Investigation of frontal and ethmoidal sinuses.
8. Investigation of sphenoidal sinus (Projection need to be taken mouth open)
**Technique and positioning**

Patient facing the film with head tipped back so the radiographic baseline is at 45° to the film. (nose chin position).

This positioning drops the dense bones of the base of skull downwards and raise the facial bones so they can be seen.
• The X ray tube is positioned with the central ray horizontal center through the occipit.

**Exposure parameter:**
- kVp: 75 – 80
- mA: 10
- Seconds: 2-3
Standard Occipitomental (0° OM)

- Orbit
- Zygomatic arch
- Lower border of mandible
- Frontal sinus
- Nasal septum
- Maxillary sinus
- Coronoid
- Odontoid process
30° occipitomental (30° OM)
30° ocipitomental (30° OM)

Main Indications

1. Detecting following middle third facial fracture
   - Le Fort I
   - Le Fort II
   - Le Fort III
2. Coronoid process fracture
Technique and positioning

• The patient is in same position as for 0⁰ OM i.e. nose chin position

• The x ray tube is aimed downwards from above the head with the central rays at 30⁰ to the horizontal, centered through the lower border of orbit.

Exposure parameter:

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<th>Parameter</th>
<th>Value</th>
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<td>kVp</td>
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30° occipitomental (30° OM)
30° occipitomental (30° OM)

- Frontal sinus
- Orbit
- Maxillary sinus
- Sphenoid sinus
- Zygomatic bone
- Coronoid process