PERIAPICAL IMAGING

1. The bisecting angle technique
2. The paralleling technique
STEPS

• Positioning of the Patient
  • For maxilla: Sagittal plane vertical and the occlusal plane horizontal
  • For mandible: the head is tilted back slightly

• Receptor Placement

• Angulation of the Tube Head
  • Horizontal Angulation $\rightarrow 0 \rightarrow$ direct the central ray through the contacts
  • Vertical Angulation $\rightarrow$ varies with the anatomy
<table>
<thead>
<tr>
<th>Projection</th>
<th>Maxilla</th>
<th>Mandible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incisors</td>
<td>+40 degrees</td>
<td>-15 degrees</td>
</tr>
<tr>
<td>Canines</td>
<td>+45 degrees</td>
<td>-20 degrees</td>
</tr>
<tr>
<td>Premolars</td>
<td>+30 degrees</td>
<td>-10 degrees</td>
</tr>
<tr>
<td>Molars</td>
<td>+20 degrees</td>
<td>-5 degrees</td>
</tr>
</tbody>
</table>

Note: With a positive (+) angulation, the aiming tube is pointed downward, and with a negative (−) angulation, it is pointed upward.

*When the occlusal plane is oriented parallel with the floor.*
DISADVANTAGES

1. In multirooted tooth
2. Alveolar ridge often projects more coronally than its true position

Distortion
THE PARALLELING TECHNIQUE
THE PARALLELING TECHNIQUE

Right-angle technique / long-cone technique

Use of lone-cone

Long source-to-object

Apparent size of the focal spot

Sharpness  Magnification
BITEWING EXAMINATIONS

• Also called interproximal

• Include the crowns of the maxillary and mandibular teeth and the alveolar crest on the same receptor
BITEWING EXAMINATIONS

1. Detecting interproximal caries in the early stages of development

2. Secondary caries below restorations that may escape recognition in the periapical views

3. Alveolar bone crest, and changes in bone height

4. Useful for detecting calculus deposits in interproximal areas (reduced exposure)
BITEWING EXAMINATIONS

1. **Horizontal Bitewing Receptors**
   - Premolar BW
   - Molar BW

2. **Vertical Bitewing Receptors**
HORIZONTAL BITEWING RECEP'TORS

• Premolar BW
  • Should include the distal half of the canines and the crowns of the premolars
  • Mandibular canine is used as the guide for placement of the receptor
  • When the x-ray beam is accurately directed through the mandibular premolar contacts, overlapping is minimal or absent in the maxillary premolar segment
  • +5 degrees → To compensate for the slight inclination of the receptor against the palatal mucosa
  • central ray will enter the line of occlusion at the point of contact between the second premolar and the first molar.
HORIZONTAL BITEWING RECEPTORS

- **Molar BW**
  - 1 or 2 mm beyond the most distally erupted molar (maxillary or mandibular).
  - +10 degrees → minimizes overlapping of the opposing cusps → improves the probability of detecting early occlusal lesions at the DEJ
  - Because the maxillary and mandibular molar contact areas may not be open from the same horizontal angulation, they may not be visible on one receptor. In this case, **it may be desirable to open the maxillary molar contacts** because the mandibular molar contacts usually are open on the periapical receptors.
  - The central ray should enter **the cheek below the lateral canthus of the eye** at the level of the occlusal plane.
External localizing ring
VERTICAL BITEWING RECEPTORS

• Moderate to extensive alveolar bone loss
OCCLUSAL IMAGING

• Large receptor (7.7 cm × 5.8 cm [3 inches × 2.3 inches]) is inserted between the occlusal surfaces of the teeth
OCCLUSAL IMAGING

1. To locate precisely roots and supernumerary, unerupted, and impacted teeth (this technique is especially useful for impacted canines and third molars)

2. To localize foreign bodies in the jaws and stones in the ducts of sublingual and submandibular glands

3. To demonstrate and evaluate the integrity of the anterior, medial, and lateral outlines of the maxillary sinus
OCCLUSAL IMAGING

4. To aid in the examination of patients with **trismus**, who can open their mouths only a few millimeters

5. To obtain information about the location, nature, extent, and displacement of **fractures** of the mandible and maxilla

6. To determine the **medial and lateral extent of disease** (e.g., cysts, osteomyelitis, malignancies) and to detect disease in the palate or floor of the mouth
OCCLUSAL IMAGING

- Maxilla:
  1. ANTERIOR MAXILLARY OCCLUSAL PROJECTION
  2. TOPOGRAPHICAL MAXILLARY OCCLUSAL PROJECTION
  3. LATERAL MAXILLARY OCCLUSAL PROJECTION

- Mandible:
  1. ANTERIOR MANDIBULAR OCCLUSAL PROJECTION
  2. TOPOGRAPHICAL MANDIBULAR OCCLUSAL PROJECTION
  3. LATERAL MANDIBULAR OCCLUSAL PROJECTION
ANTERIOR MAXILLARY OCCLUSAL PROJECTION

• The primary field of this projection includes the anterior maxilla and its dentition and the anterior floor of the nasal fossa and teeth from canine to canine.
Receptor Placement. Adjust the patient’s head so that the sagittal plane is perpendicular and the occlusal plane is horizontal to the floor. Place the receptor in the mouth with the exposure side toward the maxilla, the posterior border touching the rami, and the long dimension of the receptor perpendicular to the sagittal plane. The patient stabilizes the receptor by gently closing the mouth or using gentle bilateral thumb pressure.

Projection of Central Ray. Orient the central ray through the tip of the nose toward the middle of the receptor with approximately $+45$ degrees vertical angulation and $0$ degrees horizontal angulation.

Point of Entry. The central ray enters the patient’s face approximately through the tip of the nose.
This projection shows the palate, zygomatic processes of the maxilla, anteroinferior aspects of each antrum, nasolacrimal canals, teeth from second molar to second molar, and nasal septum.
Receptor Placement. Seat the patient upright with the sagittal plane perpendicular to the floor and the occlusal plane horizontal. Place the receptor, with its long dimension perpendicular to the sagittal plane, crosswise in the mouth. Gently push the receptor in backward until it contacts the anterior border of the mandibular rami. The patient stabilizes the receptor by gently closing the mouth.

Projection of Central Ray. Direct the central ray at a vertical angulation of +65 degrees and a horizontal angulation of 0 degrees to the bridge of the nose just below the nasion, toward the middle of the receptor.

Point of Entry. Generally, the central ray enters the patient’s face through the bridge of the nose.
This projection shows a quadrant of the alveolar ridge of the maxilla, inferolateral aspect of the antrum, tuberosity, and teeth from the lateral incisor to the contralateral third molar. In addition, the zygomatic process of the maxilla superimposes over the roots of the molar teeth.
**Receptor Placement.** Place the receptor with its long axis parallel to the sagittal plane and on the side of interest, with the tube side toward the side of the maxilla in question. Push the receptor posteriorly until it touches the ramus. Position the lateral border parallel with the buccal surfaces of the posterior teeth, extending laterally approximately 1 cm past the buccal cusps. Ask the patient to close gently to hold the receptor in position.

**Projection of Central Ray.** Orient the central ray with a vertical angulation of +60 degrees to a point 2 cm below the lateral canthus of the eye, directed toward the center of the receptor.

**Point of Entry.** The central ray enters at a point approximately 2 cm below the lateral canthus of the eye.
This projection includes the anterior portion of the mandible, the dentition from canine to canine, and the inferior cortical border of the mandible.
**Receptor Placement.** Seat the patient tilted back so that the occlusal plane is 45 degrees above horizontal. Place the receptor in the mouth with the long axis perpendicular to the sagittal plane and push it posteriorly until it touches the rami. Center the receptor with the pebbled side (tube side) down, and ask the patient to bite lightly to hold the receptor in position.

**Projection of Central Ray.** Orient the central ray with —10 degrees angulation through the point of the chin toward the middle of the receptor; this gives the ray —55 degrees of angulation to the plane of the receptor.

**Point of Entry.** The point of entry of the central ray is in the midline and through the tip of the chin.
This projection includes the soft tissue of the floor of the mouth and reveals the lingual and buccal plates of the mandible from second molar to second molar. When this view is made to examine the floor of the mouth (e.g., for sialoliths), the exposure time should be reduced to half the time used to create an image of the mandible.
Receptor Placement. Seat the patient in a semireclining position with the head tilted back so that the ala-tragus line is almost perpendicular to the floor. Place the receptor in the mouth with its long axis perpendicular to the sagittal plane and with the tube side toward the mandible. The anterior border of the receptor should be approximately 1 cm beyond the mandibular central incisors. Ask the patient to bite gently on the receptor to hold it in position.

Projection of Central Ray. Direct the central ray at the midline through the floor of the mouth approximately 3 cm below the chin, at right angles to the center of the receptor.

Point of Entry. The point of entry of the central ray is in the midline through the floor of the mouth approximately 3 cm below the chin.
This projection covers the soft tissue of half the floor of the mouth, the buccal and lingual cortical plates of half of the mandible, and the teeth from the lateral incisor to the contralateral third molar. When this view is used to provide an image of the floor of the mouth, the exposure time should be reduced to half that used to provide an image of the mandible.
Receptor Placement. Seat the patient in a semireclining position with the head tilted back so that the alob-tagus line is almost perpendicular to the floor. Place the receptor in the mouth with its long axis initially parallel with the sagittal plane and with the pebbled side down toward the mandible. Place the receptor as far posterior as possible, then shift the long axis buccally (right or left) so that the lateral border of the receptor is parallel with the buccal surfaces of the posterior teeth and extends laterally approximately 1 cm.

Projection of Central Ray. Direct the central ray perpendicular to the center of the receptor through a point beneath the chin, approximately 3 cm posterior to the point of the chin and 3 cm lateral to the midline.

Point of Entry. The point of entry of the central ray is beneath the chin, approximately 3 cm posterior to the chin and approximately 3 cm lateral to the midline.
Extraoral Projections
1. Lateral Skull Projection (Lateral Cephalometric Projection)
2. Submentovertex (Base) Projection
3. Waters Projection
4. Posteroanterior Skull Projection (Posteroanterior Cephalometric Projection)
5. Reverse Towne Projection (Open-Mouth)
6. Mandibular Oblique Lateral Projections
   - Mandibular Body Projection
   - Mandibular Ramus Projection
TERMINOLOGY

- **Canthomeatal line** = A plane passing through the junction of the upper and lower eyelids and the center of the ear canal.

- **Frankfort horizontal plane** = A craniometric surface determined by the inferior borders of the bony orbits and the upper margin of the auditory meatus.
LATERAL CEPHALOMETRY

- Cephalometry = measurement and study of the proportions of the head and face

- Image Receptor and Patient Placement
  - The image receptor is positioned parallel to the patient's midsagittal plane.
  - The patient is placed with the left side toward the image receptor (U.S. standards).
  - A wedge filter is used over the anterior aspect of the beam.

- Position of the Central X-Ray Beam
  - The central beam is perpendicular to the midsagittal plane.
  - Centered over the external auditory meatus.
LATERAL CEPHALOMETRY

• Resultant Image

• Exact superimposition of right and left sides is impossible

• Clinoid processes and inferior turbinates should be nearly superimposed
LATERAL CEPHALOMETRY

- Nasal bone
- Frontal sinus
- Sphenoidal sinus
Image Receptor and Patient Placement

- The image receptor is positioned parallel to the patient's transverse plane and perpendicular to the midsagittal and coronal planes.
- The canthomeatal line forms a 10-degree angle with the image receptor.

Position of the Central X-Ray Beam

- The central beam is perpendicular to the image receptor and directed from below the mandible toward the vertex of the skull, centered about 2 cm anterior to a line connecting the right and left condyles.
• The midsagittal plane (represented by an imaginary line extending from the interproximal space of the maxillary central incisors through the nasal septum, to the middle of the anterior arch of the atlas, and to the dens) should divide the skull image in two symmetric halves.

• An underexposed view is required for the evaluation of the zygomatic arches.

• Jug handle view.
Radiographic Positioning

Skull

Submentovertex (SMV)
SUBMENTOVERTEX (BASE) PROJECTION

- Zygomatic arch
- Sphenoid sinus
Image Receptor and Patient Placement

- The image receptor is placed in front of the patient and perpendicular to the midsagittal plane.
- The patient's head is tilted upward so that the canthomeatal line forms a 37-degree angle with the image receptor.
- If the patient's mouth is open, the sphenoid sinus will be seen superimposed over the palate.

Position of the Central X-Ray Beam

- The central beam is perpendicular to the image receptor and centered in the area of the maxillary sinuses.
The midsagittal plane should divide the skull image into two symmetric halves. The petrous ridge of the temporal bone should be projected below the floor of the maxillary sinus.
WATERS PROJECTION

- Coronoid process
- Orbit
- Zygoma
- Maxillary sinus
POSTEROANTERIOR (PA) SKULL PROJECTION

- **Image Receptor and Patient Placement**
  - The image receptor is placed in front of the patient and perpendicular to the midsagittal plane.
  - The patient’s head is placed so that the canthomeatal line forms a 10-degree angle with the horizontal plane and the Frankfort plane is perpendicular to the image receptor.
- **PA Skull**
  - The canthomeatal line is perpendicular to the image receptor.
- **Position of the Central X-Ray Beam**
  - The central beam is perpendicular to the image receptor, directed from the posterior to the anterior, parallel to the patient’s midsagittal plane, and is centered at the level of the bridge of the nose.
• The midsagittal plane should divide the skull image into two symmetric halves.
• The superior border of the petrous ridge should lie in the lower third of the orbit.
POSTEROANTERIOR CEPHALOMETRIC PROJECTION

- Orbit
- Nasal cavity
- Frontal sinus
REVERSE-TOWNE PROJECTION (OPEN-MOUTH)

- Image Receptor and Patient Placement
  - The image receptor is placed in front of the patient and perpendicular to the midsagittal plane.
  - The patient’s head is tilted downward so that the canthomeatal line forms a 25- to 30-degree angle with the image receptor.
  - The patient’s mouth is opened so that the condylar heads are located inferior to the articular eminence.

- Position of the Central X-Ray Beam
  - The central beam is perpendicular to the image receptor and parallel to the patient’s midsagittal plane and it is centered at the level of the condyles.
The midsagittal plane should divide the skull image into two symmetric halves.

The petrous ridge of the temporal bone should be superimposed at the inferior part of the occipital bone, and the condylar heads should be projected inferior to the articular eminence.
REVERSE-TOWNE PROJECTION (OPEN-MOUTH)

- Condylar head
- Condylar neck
FIG. 12-7 Anatomic landmarks identified in the oblique lateral projection of the mandibular body.
MANDIBULAR OBLIQUE RAMUS PROJECTION

FIG. 12-8 Anatomic landmarks identified in the oblique lateral projection of the mandibular
MANDIBULAR OBLIQUE RAMUS PROJECTION

- Ramus
- Coronoid process
- Condylar neck
THANK YOU FOR YOUR ATTENTION! ANY QUESTIONS?