Intraoral radiographic techniques

Introduction
There are three main types of intraoral radiographs:

- Periapical radiograph
- Bitewing radiograph
- Occlusal radiograph

The anatomic area of interest and type of pathology suspected helps the clinician to decide the type of radiograph to be taken.

Periapical radiograph
The Periapical radiograph (IOPA) is the basic investigation that gives graphic information about the alveolar bone, periodontal areas and the hard tissues of the tooth. Each image usually shows 2-4 teeth.

Indications
The clinical indications include:

1. To visualize Periapical region
2. detection of apical infection/inflammation.
3. Detailed evaluation of apical cysts and other lesions within alveolar bone.
4. To study crown and root length.
5. assessment of the periodontal status.
6. To determine the integrity of the lamina dura.
8. Selection of cases for endodontic treatment.
10. In the evaluation of fracture of the teeth and associated alveolar bone.
11. To evaluate root apex formation.
12. To study eruption pattern and stage of eruption.
13. Assessment of the presence and position of unerupted or impacted teeth, supernumerary teeth, and root stumps.
15. Preoperative assessment and postoperative appraisal of apical surgery.

Ideal positioning requirements
The ideal requirements include: (Fig. 1)

- The tooth under investigation and the image receptor should be in contact or, if not feasible, as close together as possible.
- The tooth and the image receptor should be parallel to one another.
- The image receptor should be positioned with its long axis vertically for incisors and canines, and horizontally for premolars and molars with sufficient receptor beyond the apices to record the apical tissues.
- The X-ray tube head should be positioned so that the beam meets the tooth and the image receptor at right angles in both the vertical and the horizontal planes.
- The positioning should be reproducible.
Radiographic techniques

Basically there are two techniques for taking periapical radiography:

- Paralleling technique
- Bisecting angle technique

Paralleling technique

It is also called the extension cone paralleling technique, right angle technique, and long cone technique.

This technique is based on the concept of parallelism, the film is placed in the mouth parallel to the long axis of the tooth and the central X-ray beam is directed perpendicular to the film and the long axis of the tooth. So special holders which keep the film parallel to the long axis of the tooth are utilized. (Fig. 2)

A long cone of 12-16 inches is used. The kVp used is usually 85-90 kVp. The X-ray are directed perpendicular to the film and therefore there is minimum geometric distortion, less magnification and more definition (Fig. 3).
Fig. 3: The magnification of the image that results from using A. a short focal spot and a diverging X-ray beam and B. a long focal spot and a near-parallel X-ray beam.

A variety of holders has been developed for this technique could be Rinn XCP instrument (X-extended, C-cone, and P-paralleling) (Fig. 4). The three basic components:
  o A mechanism for holding the image receptor parallel to the teeth that also prevents bending of the receptor.
  o A bit block or platform.
  o An X-ray beam aiming device.

Fig. 4: Posterior Rinn XCP image receptor holder.

The holder design used depends upon whether the tooth under investigation is:
- Anterior or posterior.
- In the mandible or maxilla.
- On the right or left hand side of the jaw.

As in Fig. 5, 6, 7, and 8

Fig. 5: A. The appearance of the film packet when viewed through the locator ring of a correctly assembled Rinn XCP holder B. The appearance when the film holder has been assembled incorrectly.
Fig. 6: A. selection of film packet and digital phosphor plate holders designed for the paralleling technique. B. Holders incorporating additional rectangular collimation. C. Blue anterior and yellow posterior Rinn XCP-DS solid-state digital sensor holder. D. Green/yellow anterior and red/yellow posterior Hawe-Neos holders suitable for film packets and digital phosphor.

Fig. 7: A. The anterior Rinn XCP holder suitable for imaging the maxillary incisors and canines. B Diagram showing four small image receptors required to image the right and left maxillary incisors and canines. C. The anterior Rinn XCP holder suitable for imaging the mandibular incisor and canines. D Diagram showing the three small image receptors required to image the right and left mandibular incisors and canines.
Fig. 8: A. The posterior Rinn XCP holder assembled for imaging the right maxillary premolars and molars. B. The posterior holder assembled for imaging the left maxillary premolars and molars. C. Diagram showing the two large image receptors required to image the right and left premolars and molars in each quadrant. D. The posterior Rinn XCP holder or imaging the right mandibular premolars and molars. E. The posterior Rinn XCP holder assembled for imaging the left mandibular premolars and molars.

Positioning techniques
The radiographic techniques for the permanent dentition as follows:
1. The patient is positioned with the head supported and with the occlusal plane horizontal.
2. The holder and image receptor are placed in the mouth as follows:
   a. Maxillary incisors and canines: the image receptor is positioned sufficiently posteriorly to enable its height to be accommodated in the vault of the palate
   b. Mandibular incisors and canines: the image receptor is positioned in the floor of the mouth, approximately in line with the lower canines or first premolars
   c. Maxillary premolars and molars: the image receptor is placed in the midline of the palate, again to accommodate its height in the vault of the palate
   d. Mandibular premolars and molars: the image receptor is placed in the lingual sulcus next to the appropriate teeth.
3. The holder is rotated so that the teeth under investigation are touching the bite block.
4. A cottonwool roll is placed on the reverse side of the bite block. This often helps to keep the tooth and image receptor parallel and may make the holder less uncomfortable.
5. The patient is requested to bite gently together, to stabilize the holder in position.
6. The locator ring is moved down the indicator rod until it is just in contact with the patient’s face. This ensures the correct focal spot to film distance.
7. The spacer cone is aligned with the locator ring. This automatically sets the vertical and horizontal angles and centres the X-ray beam on the image receptor.
8. The exposure is made.
Positioning clinically using film packets digital phosphor plates is shown in following different area of the mouth:
Maxillary central incisor (Fig. 9) Maxillary canine (Fig. 10) Maxillary premolars (Fig. 11) Maxillary molars (Fig. 12) Mandibular incisors (Fig. 13) Mandibular canine (Fig. 14) Mandibular premolars (Fig. 15) Mandibular molars (Fig. 16)

Note:
1. Full mouth survey is the terminology used to describe the full collection of 15 periapical radiographs (7 anterior and 8 posterior) showing the full dentition.
2. When using film packets and digital phosphor plates the end of the receptor with the orientation dot should be placed opposite the crowns of the teeth to avoid subsequent superimposition of the dot over an apex.

Positioning using solid-state digital sensors
Clinical positioning of holders for the paralleling technique when using solid-state digital can be more difficult because of the bulk and absolute rigidity of the sensor. Those systems employing cables also require extra care with regard to the position of the cable to avoid damaging it. Once the holder is inserted into the mouth, the positioning of the tubehead is the same as described previously when using other types of image receptors (Fig. 17).

Fig. 9: A. Patient positioning (maxillary central incisor). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.
Fig. 10. A. Patient positioning (maxillary canine). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.

Fig. 11 A. Patient positioning (maxillary premolars). B. Diagram of the positioning. C Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.
Fig. 12: A. Patient positioning (maxillary molars). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.

Fig. 13: A. Patient positioning (mandibular incisors). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.
Fig. 14: A. Patient positioning (mandibular lateral and canine). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.

Fig. 15: A. Patient positioning (mandibular premolars). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.
Fig. 16: A. Patient positioning (mandibular molars). B. Diagram of the positioning. C. Plan view of the positioning. D. Resultant radiograph with the main radiographic features indicated.

Fig. 17: A. Anterior and posterior Planmeca solid-state sensor holders and their clinical positioning for B. Maxillary incisors. C. Maxillary molars, D. Mandibular incisors and E. Mandibular molars.
Bisected angle technique

Bisecting angle technique is also called as bisecting technique, bisection-of-the-angle technique, and short-cone technique. This technique is based on Cieszynski’s rule of isometry which states that two triangles are equal if they have two equal angles and have a common side. This rule has also been proposed by Price. This technique is performed by keeping the film as close to the teeth as possible. The central X-ray beam is directed perpendicular to an imaginary bisector that bisects the angle formed by the long axis of the tooth and the film.

The imaginary bisector creates two equal angles and provides a common side for the two imaginary equal triangles. The two imaginary triangles are right angles and are congruent. The hypotenuse of the imaginary triangle is represented by the long axis of the tooth and the other hypotenuse is represented by the vertical plane of the film.

While performing this technique, specific head alignment and specific vertical angulations are necessary. The central X-ray beam should be perpendicular to the imaginary bisector bisecting the angle formed by the long axis of the tooth and the film. An 8 inch cone is normally used. kVp used is usually 55-65 kVp.

Angulation of tube head

The position of the X-ray machine tube head is usually adjusted in 2 planes in a vertical and a horizontal angulation.

Vertical angulation of the X-ray tubehead

The angle formed by continuing the tine central ray until it meets the occlusal determines the vertical angulation of the beam to the occlusal plane (Fig. 18).

Note: Vertical angles are often quoted but inevitably they are only approximate. Patient differences including head position, and individual tooth position and inclination mean that each positioning should be assessed independently. The vertical angulations suggested should be taken only as a general guide. The various vertical angulations to be followed while performing this technique are given in Table 1.

<table>
<thead>
<tr>
<th>TEETH</th>
<th>VERTICAL ANGULATION IN DEGREE</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Maxillary</td>
</tr>
<tr>
<td>Incisors</td>
<td>+ 50</td>
</tr>
<tr>
<td>Canine</td>
<td>+45</td>
</tr>
<tr>
<td>Premolar</td>
<td>+30</td>
</tr>
<tr>
<td>Molar</td>
<td>+25</td>
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Table 1: Different vertical angulation

Horizontal angulation of the X-ray tubehead

In the horizontal plane, the central ray should be aimed through the interproximal contact areas, to avoid overlapping the teeth. The horizontal angulation is therefore determined by the shape of the arch and the position of the teeth (Fig. 19-23).
Fig. 18: Bisected technique

Fig. 19: The various horizontal angulations of the X-ray Diagram of:
A. the upper arch and B. the lower arch.

Fig. 20: The horizontal angulation for maxillary and mandibular teeth

Fig. 21: The position of the cone for mandibular radiograph
Fig. 22: The position of the cone for maxillary radiograph

Fig. 23: Recommended vertical angulation for mandibular radiographs

Fig. 23: Recommended vertical angulation for maxillary radiographs
Positioning techniques
The bisected angle technique can be performed either by using an image receptor holder to support the image receptor in the patient's mouth or by asking the patient to support the film gently using either an index finger or thumb.

Using film packet/digital sensor holders
Various holders are available (Fig. 24). The Rinn Bisected angle instruments (BAI) closely resemble the paralleling technique holders and consist of the same three basic components, image receptor holding mechanism, bite block and an X-ray beam-aiming device, but the image receptor is not held parallel to the teeth. The more simple holders and the disposable bite blocks hold the image receptor in the desired position but the X-ray tubehead then has to be aligned independently. In summary:
1. The image receptor is pushed securely into the chosen holder. Either a large or small size of image receptor is used so that the particular tooth being examined is in the middle of the receptor, as shown in (Fig 25). When using a film packet the white surface faces the X-ray tubehead and the film orientation dot is opposite the crown.
2. The X-ray tubehead is positioned using the beam-aiming device if available OR the operator has to assess the vertical and horizontal angulations by observation and then position the tubehead without a guide.
3. The exposure is made.

Using the patient's finger
1. The appropriate sized image receptor is positioned and orientated in the mouth as shown in (Fig. 18) with about 2 mm extending beyond the incisal or occlusal edges, to ensure that all of the tooth will appear on the image. The patient is then asked to gently support the image receptor using either an index finger or thumb.
2. The operator then assesses the vertical and horizontal angulations by observation and positions the tubehead without a guide, the effects of incorrect tubehead position are shown in (Fig. 26).
3. The exposure is made.
The specific positioning for different areas of the mouth, using both simple holders and the patient's finger to support the image receptor (Fig.27-34).
Fig. 25: Diagrams showing the general requirements of the image receptor position for A anterior and B posterior teeth.

Fig. 26: Diagrams showing the effects of incorrect vertical tubehead positioning. A Foreshortening of the image. B Elongation of the image.

Positioning using film packets and digital phosphor plates

maxillary central incisors

Fig. 27: Patient positioning with the patient A. Supporting the image receptor with the ball of the left thumb B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, incisor and X-ray beam.

Maxillary canine

Fig. 28: Patient positioning with the patient A. supporting image receptor with the ball of the right index finger and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, canine and X-ray beam.
Maxillary premolars

Fig. 29: Patient positioning with the patient A. supporting the image receptor and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, premolar and X-ray beam.

Maxillary molars

Fig. 30: Patient positioning with the patient A. supporting the image receptor and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative position of image receptor, molar and X-ray beam.

Mandibular incisors

Fig. 31: Patient positioning with A. the patient's index finger on the upper edge of the image receptor, supporting and depressing it into the floor of the mouth and B. using the Rinn Green Stabe® bite block. C. Diagram of the relative position of image receptor, incisor and X-ray beam.
Mandibular canine

Fig. 32: Patient positioning with the patient A. supporting and depressing the upper edge of the image receptor and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, canine and X-ray beam.

Mandibular premolars

Fig. 33: Patient positioning with the patient A. supporting the image receptor and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, premolar and X-ray beam.

Mandibular molars

Fig. 34: Patient positioning with the patient A. supporting the image receptor and B. using the Rinn Greene Stabe® bite block. C. Diagram of the relative positions of image receptor, molar and X-ray beam.

Advantages of the paralleling technique:

- Geometrically accurate images are produced with little magnification.
- The shadow of the zygomatic buttress appears above the apices of the molar teeth.
- The periodontal bone levels are well represented.
- The periapical tissues are accurately shown with minimal foreshortening or elongation.
The crowns of the teeth are well shown enabling the detection of approximal caries.
The horizontal and vertical angulations of the X-ray tubehead are automatically determined by the positioning devices if placed correctly.
The X-ray beam is aimed accurately at the centre of the image receptor, all areas of the image receptor are irradiated and there is no coning off or cone cutting.
Reproducible radiographs are possible at different visits and with different operators.
The relative positions of the image receptor, teeth and X-ray beam are always maintained, irrespective of the position of the patient's head. This is useful for some patients with disabilities.

Disadvantages of the paralleling technique
× Positioning of the image receptor can be very uncomfortable for the patient, particularly for posterior teeth, often causing gagging.
× Positioning the holders within the mouth can be difficult for inexperienced operators particularly when using solid-state digital sensors.
× The anatomy of the mouth sometimes makes the technique impossible, e.g. a shallow, flat palate.
× The apices of the teeth can sometimes appear vary near the edge of the image.
× Positioning the holders in the lower third molar regions can be very difficult.
The technique cannot be performed satisfactorily using a short focal spot to skin distance (i.e. a short spacer cone) because of the resultant magnification.
The holders need to be autoclavable or disposable.

Advantages of the bisected angle technique
• Positioning of the image receptor is reasonably comfortable for the patient in all areas of the mouth.
• Positioning is relatively simple and quick.
• If all angulations are assessed correctly, the image of the tooth will be the same length as the tooth itself and should be adequate (but not ideal) for most diagnostic purposes.

Disadvantages of the bisected angle technique
• The many variables involved in the technique often result in the image being badly distorted.
• Incorrect vertical tube head angulation will result in foreshortening or elongation of the image.
• The periodontal bone levels are poorly shown.
• The shadow of the zygomatic buttress frequently overlies the roots of the upper molars.
• The horizontal and vertical angles have to be assessed by observation for every patient and considerable skill is required.
• It is not possible to obtain reproducible views.
• Coning off or cone cutting may result if the central ray is not aimed at the centre of the image receptor, particularly if using rectangular collimation.
• Incorrect horizontal tube head angulation will result in overlapping of the crowns and roots.
• The crowns of the teeth are often distorted, thus preventing the detection of approximal caries.
• The buccal roots of the maxillary premolars and molars are foreshortened. (Fig. 35)
Bitewing radiography

The bisecting angle technique requires the primary ray to be at angle which varies from area to area, and which is not perpendicular to the long axis of the tooth. This does not allow good visualization of initial lesions of interproximal caries, as periodontal lesions. Bitewing radiography is that intraoral technique which allows the clinicians to evaluate initial lesions by passing the primary ray perpendicular to the long axis of the respective teeth (fig. 35)

Indications for bitewing technique:
1. In the diagnosis of interproximal caries.
2. Detection of secondary caries under the restoration.
3. To study the height of the pulp chamber.
4. To check the health of inter-dental alveolar bone in health and periodontal disease.
5. In the diagnosis of pulp stone.
6. To study occlusion of the teeth.
7. To detect calculus deposits in inter-dental areas.
8. To determine if restoration is fractured.
9. Relationship of deciduous to the permanent teeth in children with mixed dentition.

Technique requirements when using image receptor holders

- An appropriate image receptor holder with beam aiming device should be used.
- The image receptor should be positioned centrally within the holder with the upper and lower edges of the image receptor parallel to the bite-platform.
- The image receptor should be positioned with its long axis horizontally for horizontal bitewing or vertically for vertical bitewing (Fig. 36).
- The posterior teeth and the image receptor should be in contact or close together as possible.
- posterior teeth and the image receptor should be parallel. The shape of the dental arch may be necessitate two separate image receptor positions to achieve this requirement for both the premolar and the molar teeth (fig. 37).
- The beam aiming device should ensure that in the horizontal plane, the X-ray tubehead is aimed so that the beam meets the teeth and the image receptor at right angles and passes directly through all the contact areas (fig. 37).
- The beam aiming device should ensure that in the vertical plane, the X-ray tubehead is aimed downwards (approximately 5°-8°) (Fig. 38).
- The positioning should be reproducible.

Fig. 36: The ideal image receptor positions for different types of bitewings.

Fig. 37: The ideal image receptor and X-ray tubehead positions for different arch shapes
There are different holders (Fig. 39) its parts are:

- A mechanism for holding the image receptor parallel to the teeth.
- A bite-platform that replace the wing.
- An X-ray beam-aiming device.

The radiographic technique as follows:

1. The desired holder is selected together with an appropriate sized image receptor, typically a 31*41 mm film packet phosphor plate.
2. The patient is positioned with the head supported and with the occlusal plane horizontal.
3. The holder is inserted carefully into the lingual sulcus opposite the posterior teeth.
4. The anterior edge of the image receptor should be positioned opposite the distal aspect of the lower canine, in this position the image receptor extends usually just beyond the mesial aspect of the lower 3rd molar (Fig. 40).
5. The patient is asked to close the teeth firmly together onto the bite platform.
6. The X-ray tubehead is aligned accurately using the beam aiming device to achieve optimal horizontal and vertical angulations (Fig. 41).
7. The exposure is made.

Fig. 40: A. position of the simple Hawe-neos Kwikbite holder in relation to teeth. B. position of the simple Hawe-neos Kwikbite holder (with circular beam aiming device) in relation to teeth.

Fig. 41: Clinical positioning of different holders

Advantages:

✓ Relatively simple and straightforward.
✓ Image receptor is held firmly in position and cannot be displaced by the tongue.
✓ Position of X-ray tubehead is determined by the beaming device so assisting the operator in ensuring that the X-ray beam is always at right angles to the image receptor.
✓ Avoids coning or cone cutting of the anterior part of the image receptor.
✓ Holders are autoclavable or disposable.

Disadvantages:

✗ Position of the holder in the mouth is operator dependent, therefore images are not 100% reproducible, so still not ideal for monitoring progression of caries.
✗ Positioning of the film holder and image receptor can be uncomfortable for the patient particularly when using solid-state digital sensors.
✗ Some holders are relatively expensive.
✗ Holders not usually suitable for children.

Technique requirements when using a tab attached to the image receptor

- The appropriate sizes film packet or phosphor plate is selected and the tab attached, orientated appropriately for horizontal or vertical projections (Fig. 42): Large film (31*41) or long film (53*26) is used for adult, and small film (22*35) for children under 12 years.
- The patient is positioned with the head supported and with the occlusal plane horizontal.
- The shape of the dental arch and the number of film required are assessed.
- The operator holds the tab between thumb and forefinger and insets the image receptor into the lingual sulcus opposite the posterior teeth.
- The anterior edge of the image receptor should be positioned opposite the distal aspect of the lower canine (Fig. 42)
- The tab is placed on to close the teeth firmly together on the tab.
- The patient closed the teeth firmly together on the tab.
The operator assesses the horizontal and vertical angulations and positions the X-ray tubehead so that the X-ray beam is directly through the contact areas, at right angles to the teeth and image receptor, with an approximately 5°-8° downward vertical angulation (Fig. 43).

The exposure is made.

**Fig. 42:** A. Film packets with tabs

**Fig. 43:** A. Adult patient and X-ray tubehead positioning B. for child

Advantages:

- Simple.
- Inexpensive.
- The tabs are disposable, so no extra cross infection control procedures required.
- Can be used easily in children.
Disadvantages:

- Arbitrary, operator dependent assessment of horizontal and vertical angulations of the X-ray tubehead.
- Images not accurately reproducible, so not ideal for monitoring the progression of caries.
- Coning off or cone cutting of anterior part of image receptor is common.
- Not compatible with using solid-state digital sensors.
- The tongue can easily displace the image receptor. (Fig. 44)

Fig. 44: The typical bitewing for A. adult B. Child

Occlusal radiography

Occlusal radiography is intraoral radiographic techniques taken using a dental (X-ray) set where the image receptor is placed in the occlusal plane. The film packet 5.7*7.6cm.

Indications of occlusal radiography

- Periapical assessment of the upper anterior teeth for children unable to tolerate periapical holder.
- Detecting the presence of unerupted teeth, supernumeraries and odontomes.
- To visualize a relatively large segment of a dental arch.
- To precisely located roots, supernumerary, unerupted, and impacted teeth especially canine and 3rd molar.
- To identify expansion of cortical plate in case of any pathology such as cysts, tumors, and osteomyelitis.
- Assessment of fractures of anterior teeth, alveolar bone, and maxilla and mandible.
- To demonstrate and evaluate the integrity of the outline of maxillary sinus, and localization of object.
- To aid in examining patients with Trismus who can open their mouth only a few millimeters.
- To study expansion of palatal arch during orthodontic jaw expansion procedure.
- To locate salivary stones in the duct of the submandibular gland.
- To examine cleft palate.
Classification of Occlusal radiography

A. Maxillary occlusal projections: (Fig. 45)
   1. Upper standard occlusal
   2. Upper oblique occlusal.
   3. Vertex occlusal (no longer used).

B. Mandibular occlusal projections: (Fig. 46)
   1. Lower 90° occlusal (true).
   2. Lower 45° or anterior occlusal (standard).
   3. Lower oblique occlusal.

Fig. 45: Maxillary occlusal projection

Fig. 46: Mandibular occlusal projection

Technique and position

Upper standard or anterior occlusal

1. The patient is seated with the head supported and with the occlusal plane horizontal and parallel to the floor.
2. The image receptor is placed flat into the mouth on to the occlusal surfaces of the lower teeth. The patient is asked to bite together gently. The image receptor is placed centrally in the mouth with long axis crossways in adult and anteroposteriorly in children.
3. The X-ray tubehead is positioned above the patient in the midline, among downwards through the bridge of the nose at angle of 65°-70° to the image receptor (Fig. 47,48).
Upper oblique occlusal
1. The patient is seated with the head supported and with the occlusal plane horizontal and parallel to the floor.
2. The image receptor is placed flat into the mouth on to the occlusal surfaces of the lower teeth. The patient is asked to bite together gently. The image receptor is placed anteroposteriorly. It is placed to the side of the mouth under investigation.
3. The X-ray tubehead is positioned to the side of the patient, among downwards through the cheek at angle of 65°-70° to the image receptor (Fig. 49,50).
Lower 90° occlusal
1. The image receptor facing downwards is placed centrally into the mouth, on the occlusal surface of the lower teeth, with long axis crossways. The patient is asked to bite together gently. If wanted to examine other part of mandible, the image receptor is placed with its long axis anteroposieriorly over the area of interest.
2. The patient then leans forwards and then tips the head backwards as far as is comfortable, where its supported.
3. The X-ray tubehead with circular collimator fitted is placed below the patient's chin in the midline centring on an imaginary line joining the 1st molars at angle of 90° to the image receptor. (Fig. 51, 52).

Lower 45° (anterior) occlusal
1. The patient is seated with the head supported and with the occlusal plane horizontal and parallel to the floor.
2. The image receptor facing downwards is placed centrally into the mouth, on the occlusal surface of the lower teeth, with long axis anteroposieriorly. The patient is asked to bite together gently.
3. The X-ray tubehead is position in the midline centring through the chin point at angle of 45° to the image receptor. (Fig. 53, 54).
Lower oblique occlusal

1. The image receptor facing downwards is inserted into the mouth, on the occlusal surface of the lower teeth, over the side under investigation, with long axis anteroposieriorly. The patient is asked to bite together gently.

2. The patient is seated with the head supported, then rotated away from the side under investigation and the chin is raised. The rotated positioning allows the subsequent positioning of the X-ray tubehead.

3. The X-ray tubehead with circular collimator is aimed upwards and forwards towards the image receptor, from below and behind the angle of the mandible and parallel to the lingual surface of the mandible (Fig. 55, 56).

Fig. 53: A. The position of the image receptor in relation to lower arch facing downwards. B. Positioning for the lower 45° occlusal from the side. C. Diagram showing the position from the side.

Fig. 54: A lower 45° occlusal radiograph.

Fig. 54: A lower 45° occlusal radiograph.

Fig. 55: A. The position of the image receptor in relation to lower arch facing downwards for the left lower oblique. B. Positioning for the left lower oblique from the side. C. Diagram showing the position from the side.

Fig. 55: A. The position of the image receptor in relation to lower arch facing downwards for the left lower oblique. B. Positioning for the left lower oblique from the side. C. Diagram showing the position from the side.

Fig. 54: A lower oblique occlusal radiograph.