Intra-oral Radiographic Techniques & Object localization

Dr. Irfan Adil Majid
Assistant Professor of
Oral Medicine and
Oral and Maxillofacial Radiology

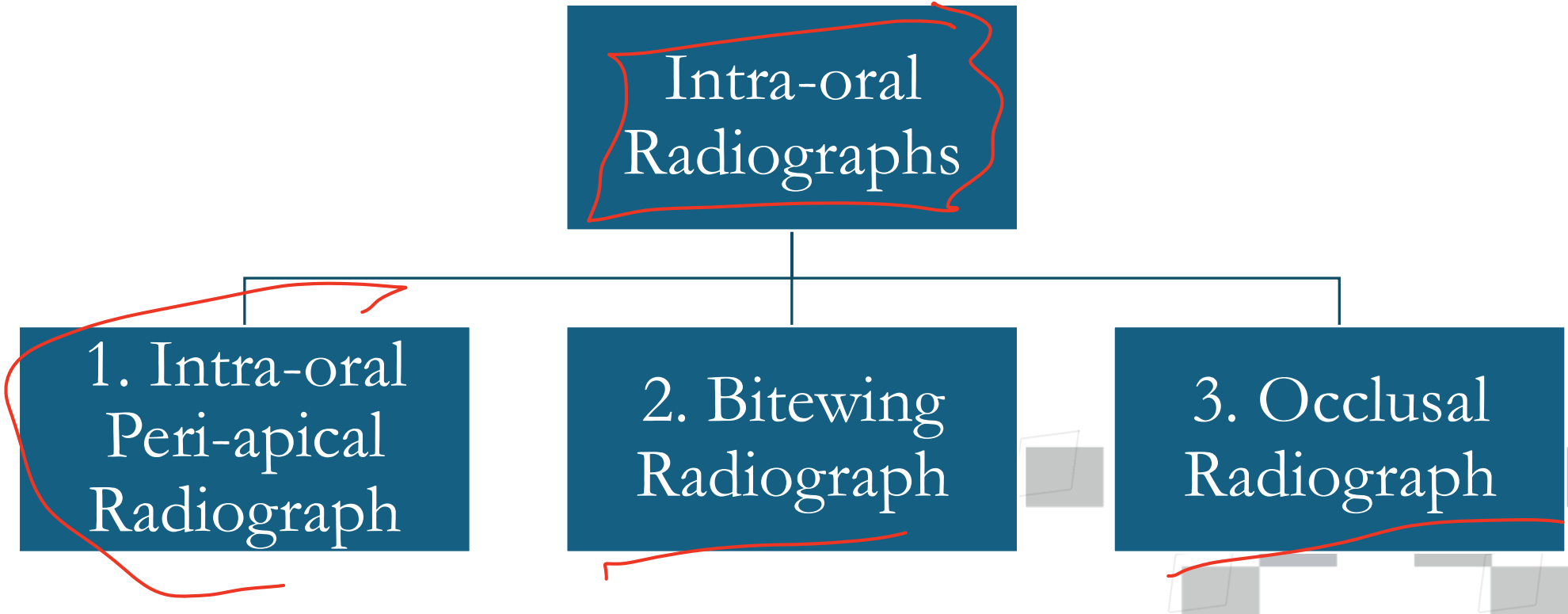
Lecture Learning Outcome

- State the principles of intra-oral radiographic technique to apply into practice the same.
- Classify intra-oral radiographic techniques.
- Describe the principles of intra-oral radiography.
- Enumerate the differences, advantages and disadvantages between bisecting angle and paralleling technique.
- Recollect vertical angulations of all maxillary and mamndibular teeth.
- State the principle of object localization.
- Describe the object localization techniques.

Lecture Outline

- Criteria of quality
- Periapical imaging
    - General steps for making exposure
    - Paralleling technique
    - Bisecting angle technique
    - Bitewing technique
- Occlusal imaging

Intraoral Radiographs are made by placing the film packet inside the oral cavity and projecting the beam at various angles from a position out side the mouth



Criteria of Quality

ideal radiograph

- Should record complete areas of interest with complete root.
- Should show at least 2mm of periapical bone.
- Should have the least possible amount of Geometric Distortion

→ distortion of shape size

- Should have optimal Density and Contrast to facilitate Interpretation

↳ amount of whitening and black in Radiograph

↳ differ between black, white, grey

Intraoral Periapical Radiography

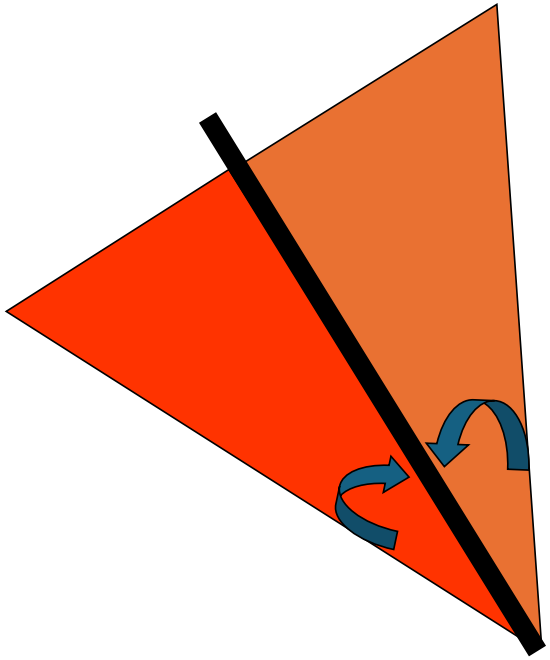
- *"Peri"* means around
- *"apical"* means apex

- Two Techniques:

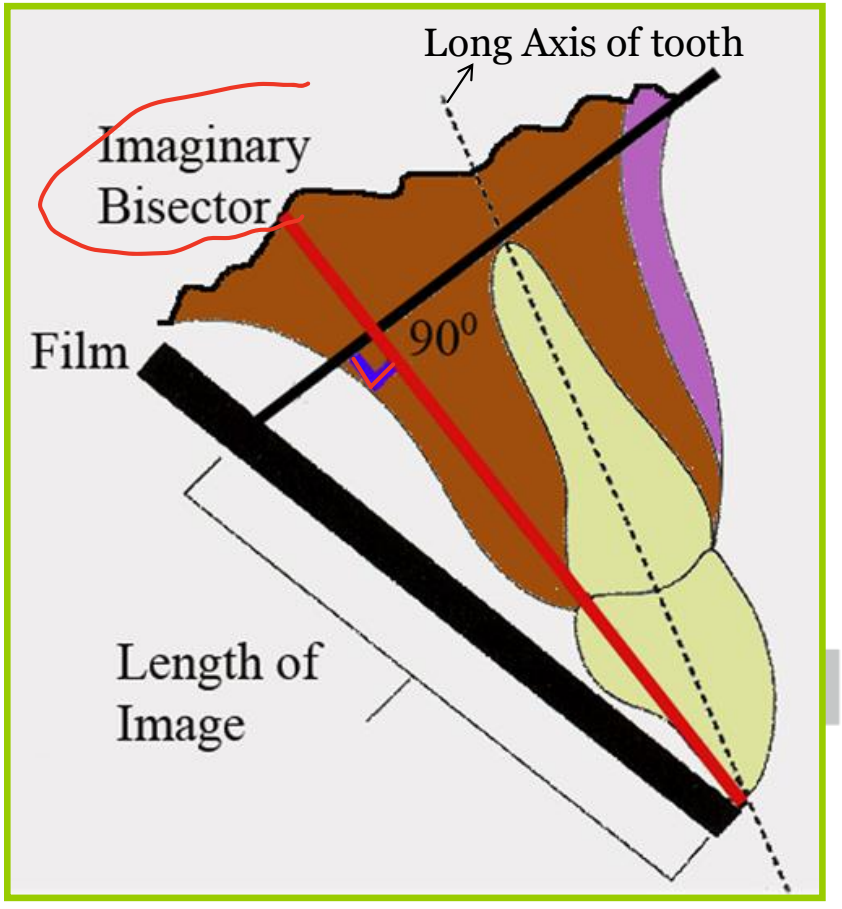
1. Bisecting Angle [Short Cone / Cieszynski's Technique]
2. Paralleling [Long Cone]

Bisecting Angle

- Cieszynski's Rule of Isometry
- States that "Two Triangles are equal when they share One Complete Side and have Two Equal Angles"



Bisecting Angle Technique



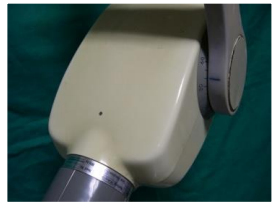
Angulations

Vertical

- Central ray Perpendicular to film and long axis of tooth

Horizontal

- Central ray through the contact areas between the teeth



Horizontal Angulation: should be always 0° i.e. Central ray passes through the contact areas between the teeth or the surface of PID should be parallel to the labial/bucal surface of the tooth.

Vertical Angulation: different for every single tooth in the mouth because all teeth have different vertical angulations

Maxillary

- Incisors +40
- Canines +45
- Premolars +30
- Molars +20

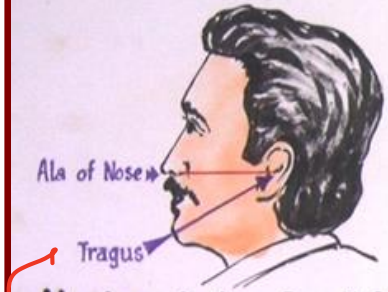
Mandibular

- Incisors - 15
- Canines -20
- Premolars -10
- Molars -5

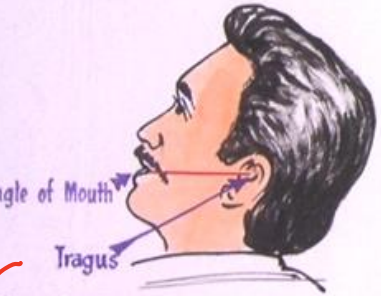
Vertical Angulations

GUIDELINES FOR BISECTING ANGLE TECHNIQUE

PATIENT HEAD POSITIONING FOR MAXILLARY & MANDIBULAR RADIOGRAPHS



Ala-tragal line Parallel to floor for Maxillary Radiographs



Line drawn from angle of mouth to tragus parallel to floor for Mandibular Radiographs

RECOMMENDED VERTICAL ANGULATIONS FOR MAXILLARY & MANDIBULAR TEETH FOR BISECTING ANGLE TECHNIQUE

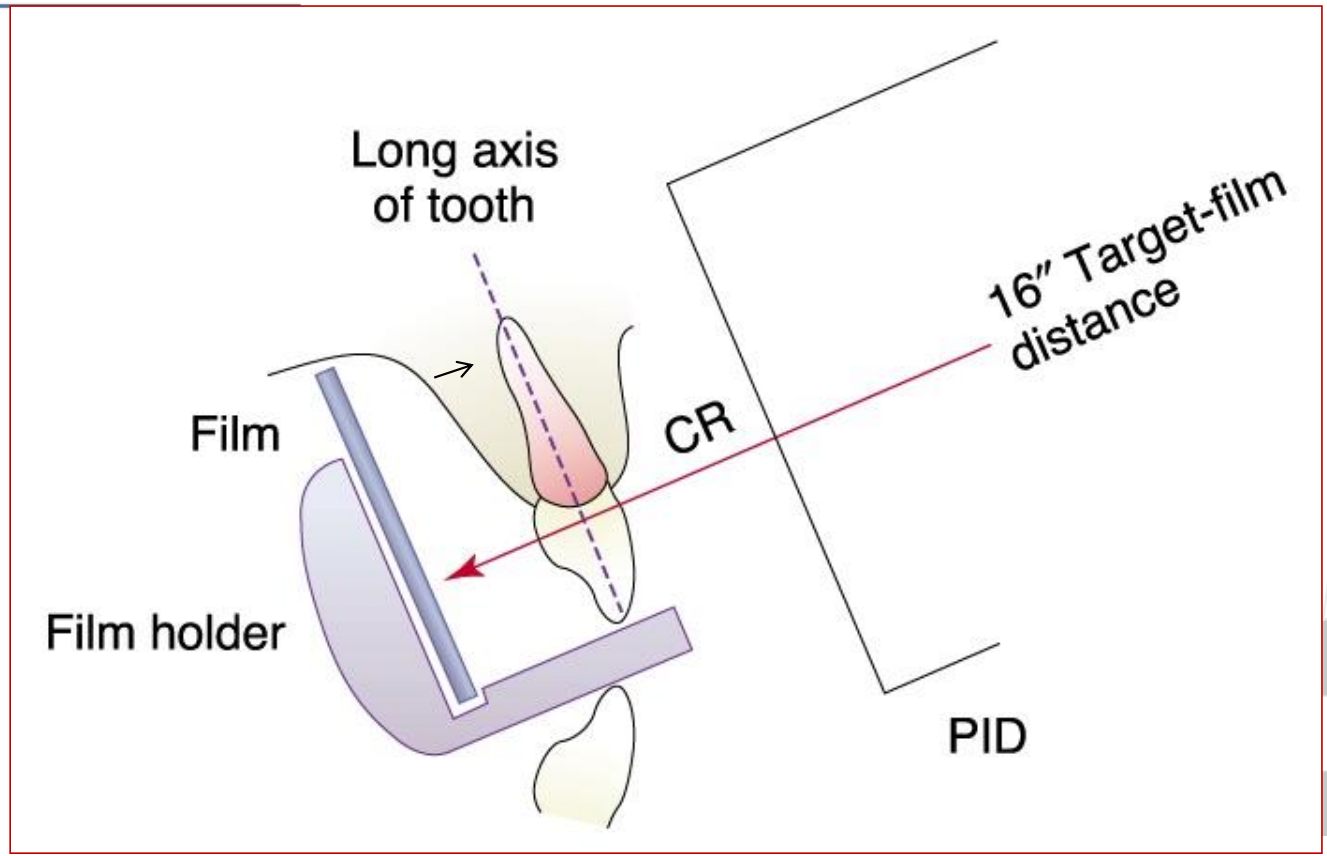
MAXILLARY TEETH :

S.No.	Tooth	Angulation	Placement of Position indicating Device
1	INCISORS	+40°	TIP OF THE NOSE
2	CANINE	+45°	ALA OF THE NOSE
3	PREMOLARS	+30°	MID PUPILLARY LINE
4	MOLARS	+20°	OUTER CANTHUS OF EYE

MANDIBULR TEETH :

S.No.	Tooth	Angulation	Placement of Position indicating Device
1	INCISORS	-15°	TIP OF THE CHIN
2	CANINE	-20°	CORNER OF THE MOUTH
3	PRE MOLARS	-10°	MID PUPILLARY LINE
4	MOLARS	-5°	OUTER CANTHUS OF EYE
5	3rd MOLAR	0°	ANGLE OF THE MANDIBLE

Paralleling Technique



Intra oral

Bitewing Radiography

not periapical

because not showing apex

- Indications

1. Incipient Dental caries
2. Inter-proximal caries
3. Progression of dental caries
4. Restorations
5. Incipient bone loss
6. Calculus

- Contraindications

no periapical

1. Periapical infection

https://xace7.github.io/DentAce/

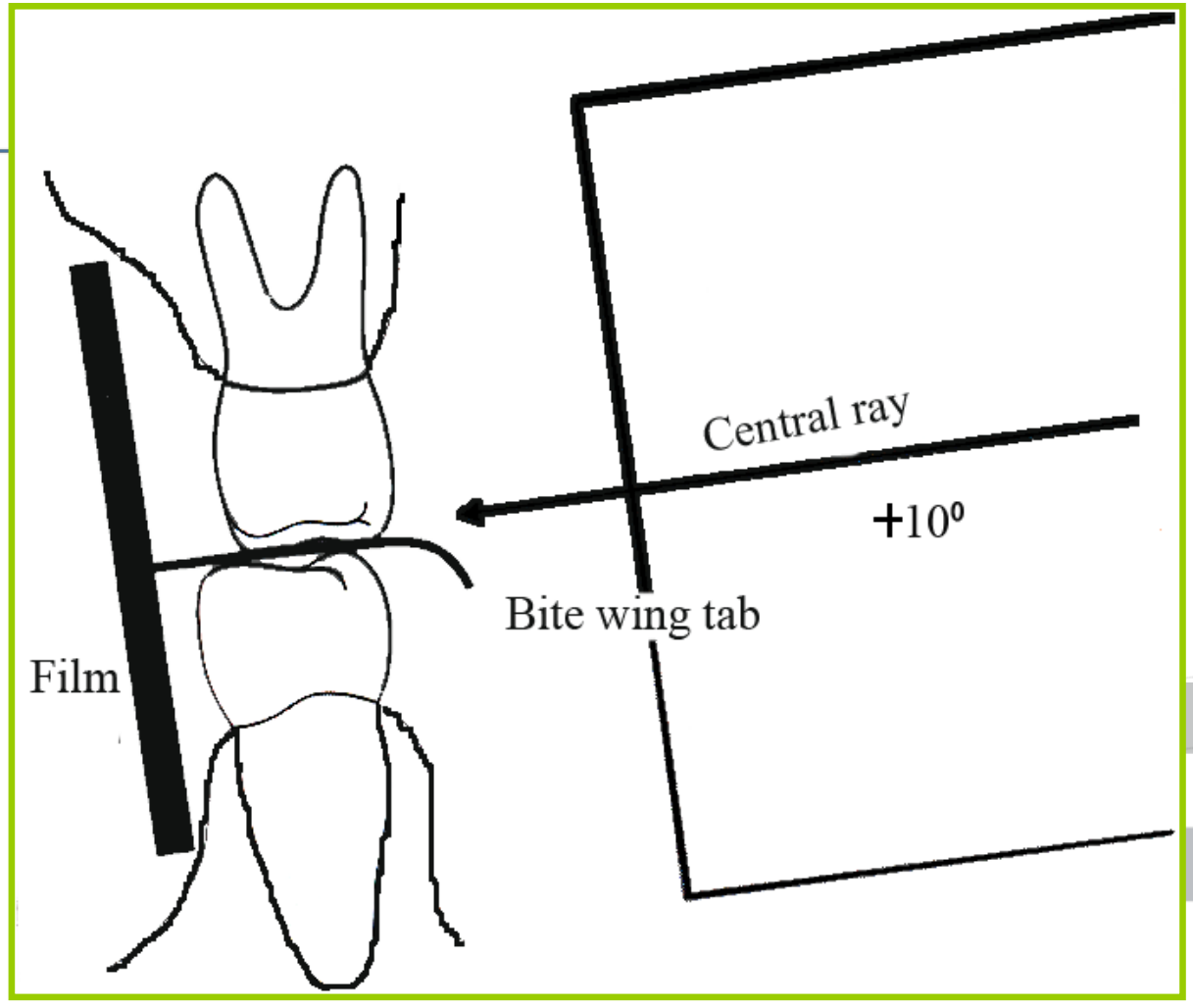
- Advantages

1. Edge enhancement
2. Shows early radiographic changes clearly

- Disadvantages

1. Radicular and periradicular structures not visible

- Principle



Angulations

Horizontal

- Central ray through the contact areas between the teeth occlusal plane

Vertical

- + 10°

apical part is not seen

Full mouth Radiography

- 21 (17 + 4)

- IOPA
- Bitewing

Object Localization

- Radiographic image is a 2D representation of a 3D object
- does not depict the buccal-lingual relationship or depth

Indications

- Localization of Impacted teeth
- Localization of Foreign bodies
- Localization of root canals in Endodontics
- To locate the mandibular canal in the buccolingual direction before bilateral sagittal split osteotomy

Techniques

- Parallax
- Right angle

Parallax Method

CHARLES A. CLARK in 1909

Synonyms

- Tube-shift Technique
- SLOB rule [**S**ame **L**ingual **O**pposite **B**uccal]
- BOPS rule [Buccal Opposite Palatal Same]
- Clark's rule

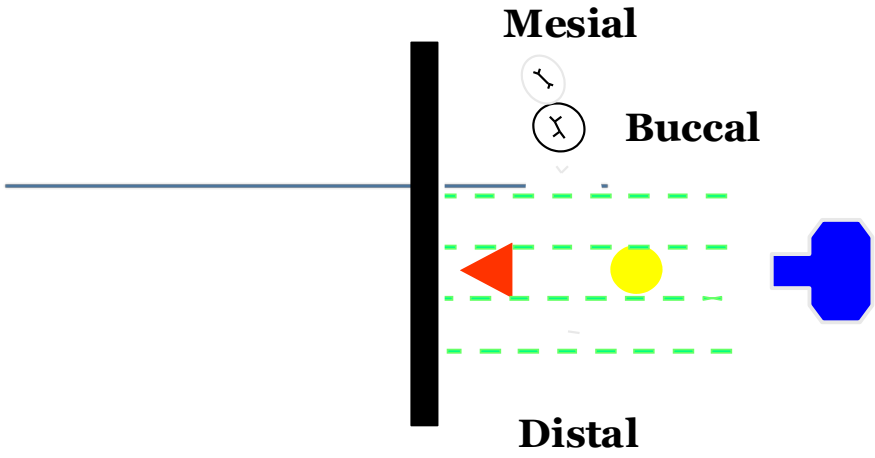
PRINCIPLE

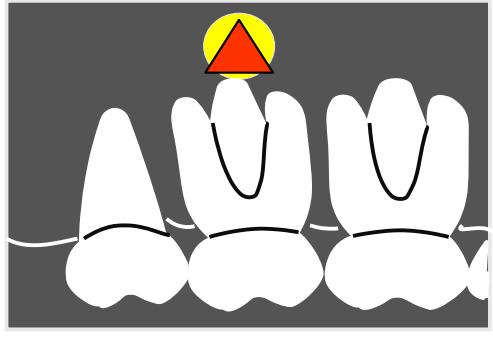
- **Parallax** is the Apparent Displacement of an Object, relative to the Image of a Reference Object, caused by an Actual Change in the Angulation of the x-ray Beam

- reference object- root of an adjacent tooth

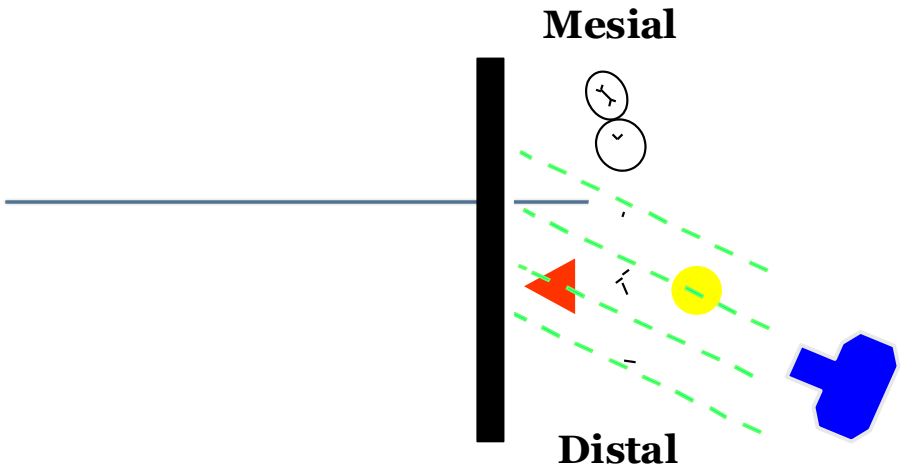
- Image of the tooth that is farther away from the x-ray tube→ moves in the same direction as the tube

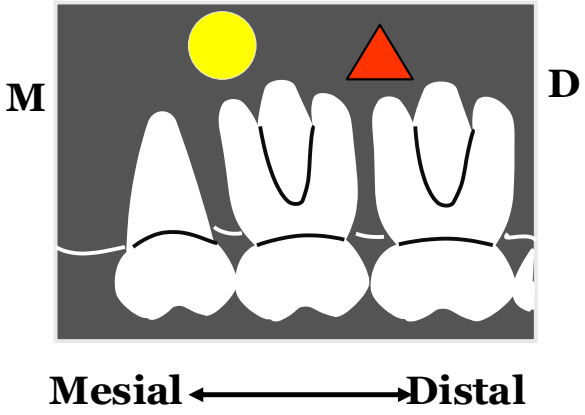
- Image of the tooth closer to the x-ray tube → moves in the opposite direction to the tube

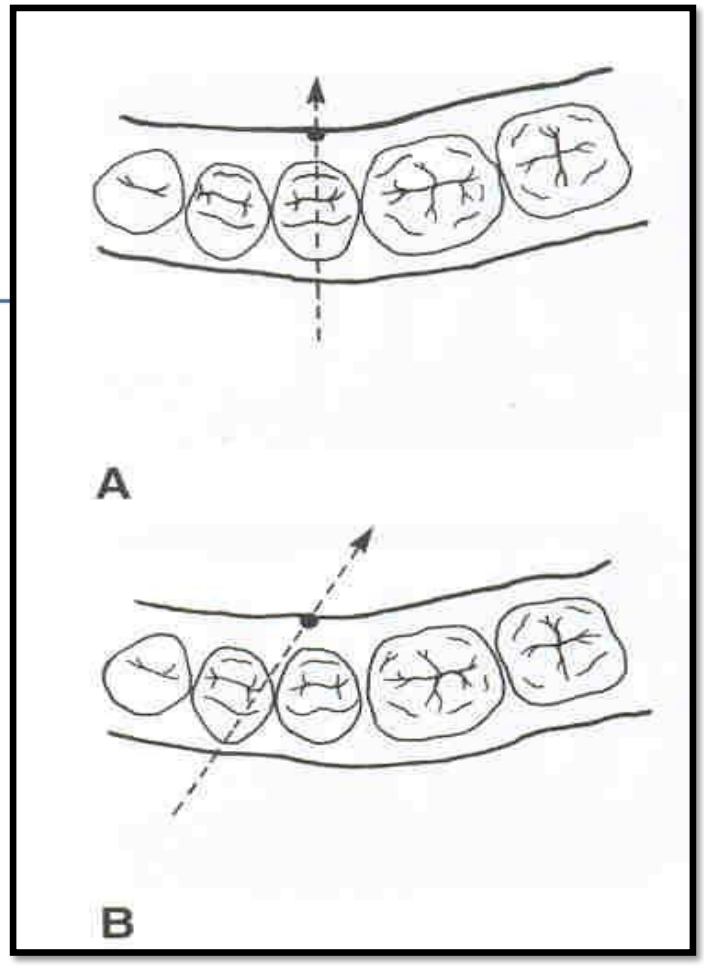

Mesial
Buccal
Distal

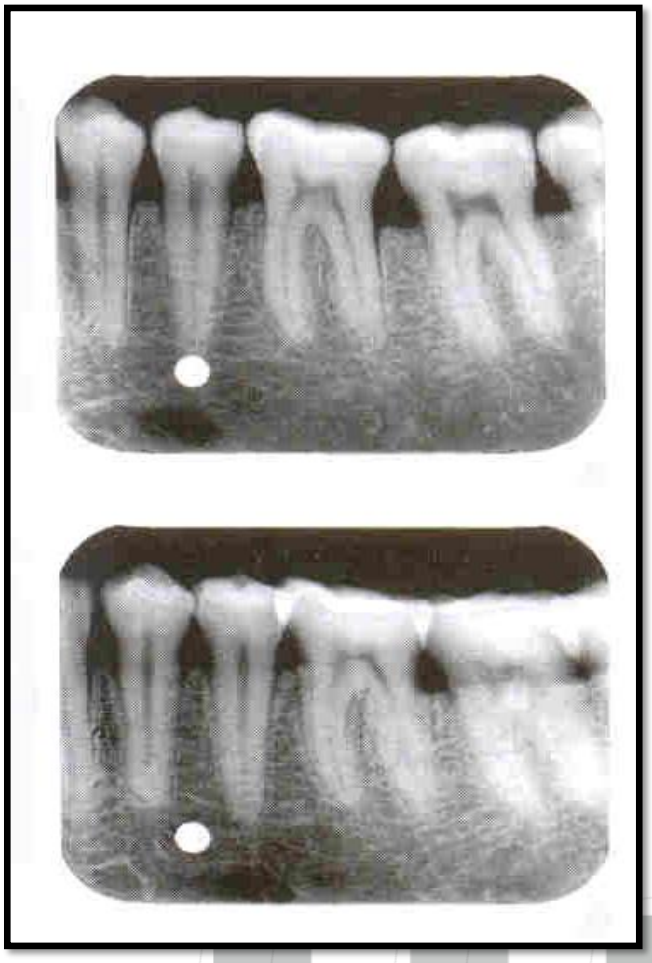

Mesial
Distal

Horizontal movement

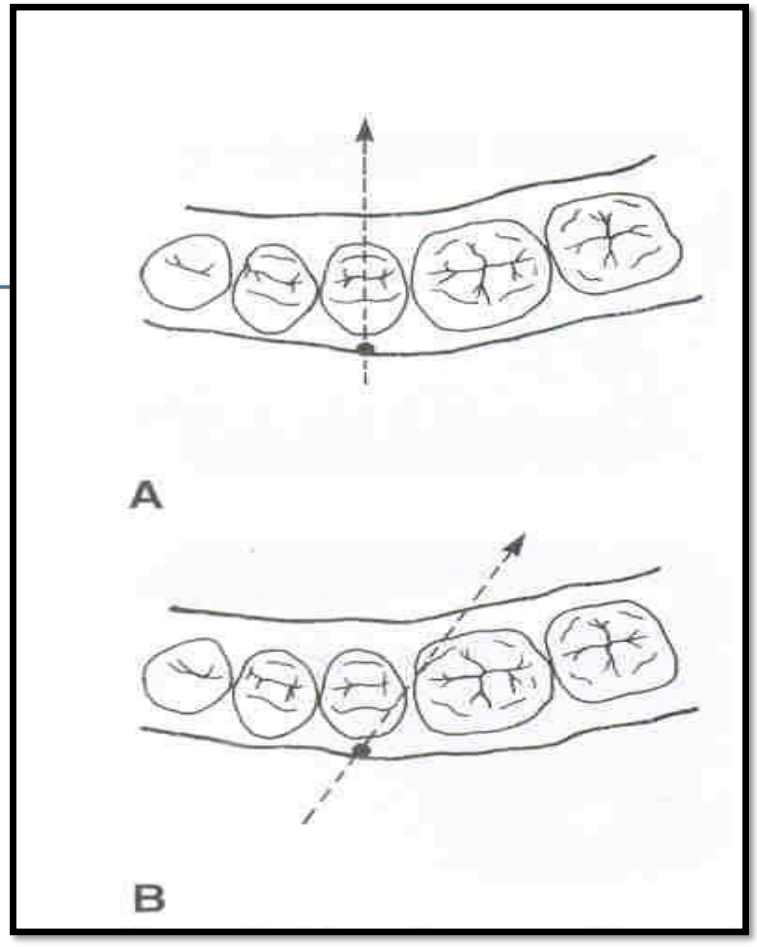




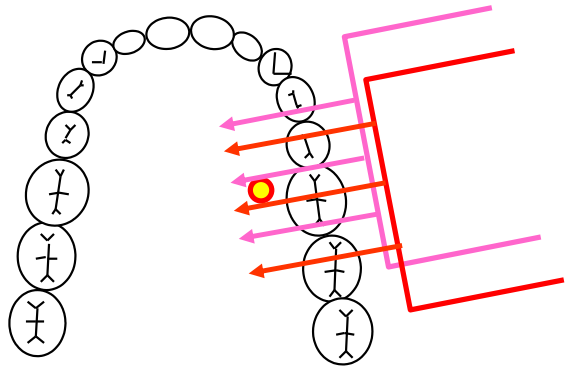


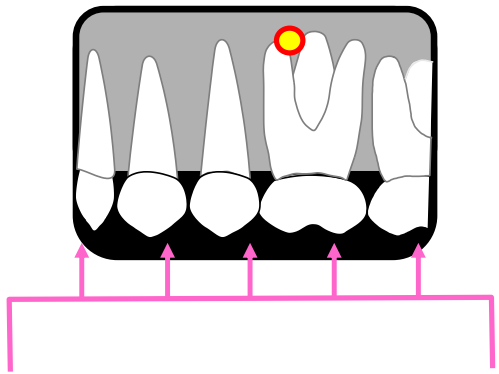


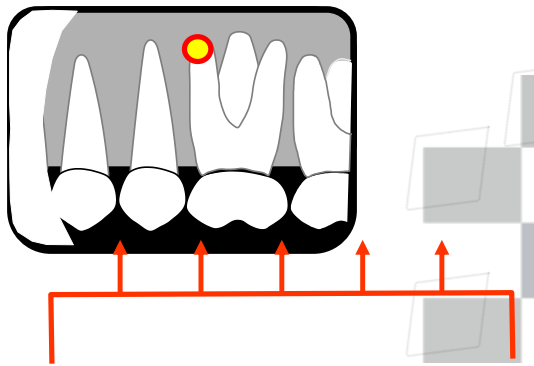
- If the object is on lingual aspect then the object appears to have moved in the same direction of tube i.e. Same lingual

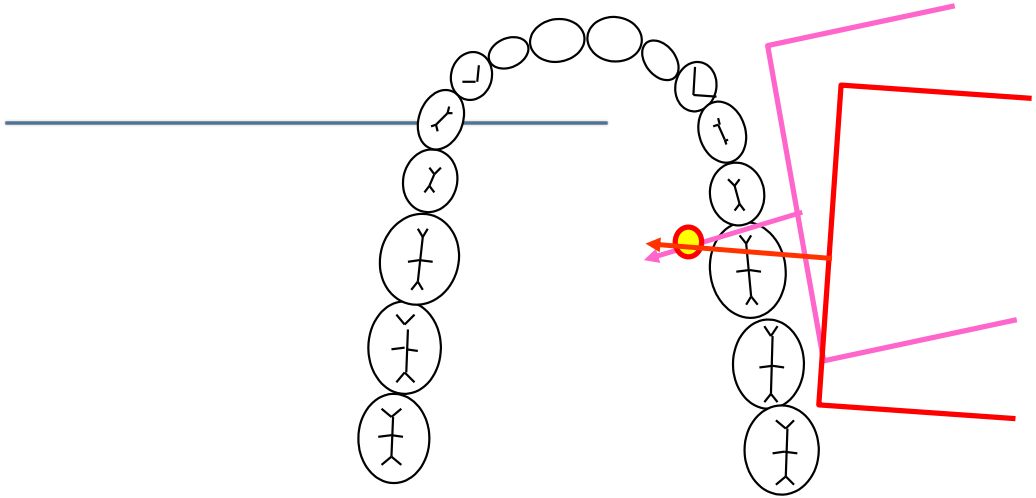


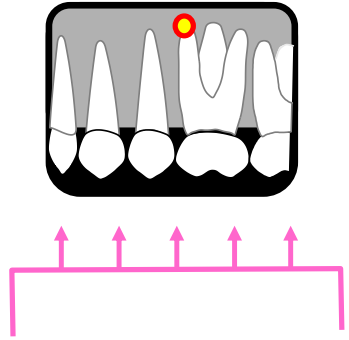
If the object is on Buccal aspect then the object appears to have moved in the Opposite Direction of Tube i.e.Opposite buccal

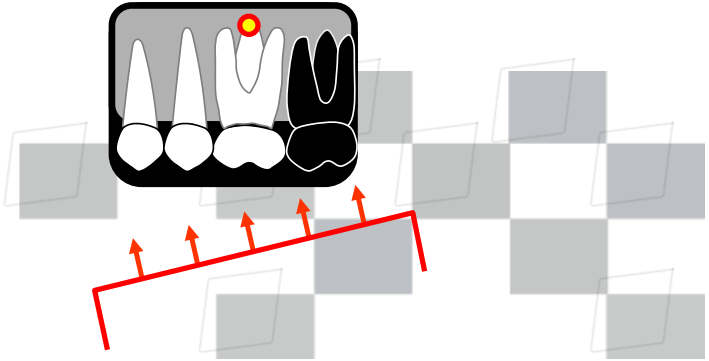












RIGHT ANGLE TECHNIQUE

Combination of Occlusal and IOPA Radiograph

Occlusal Radiography

Indications

- Evaluation of size and extent of lesions like Cysts and Tumors
- Medial and lateral extent of diseases of body of mandible and palate
- Location nature, extent and displacement of fractures of alveolar bone and teeth
- To diagnose Sialoliths
- Foreign bodies
- Patients' with trismus [minimal mouth opening required]
- Periapical assessment of teeth
- Unerupted canines, supernumeraries, odontomes
- Localization of un-erupted teeth

Techniques

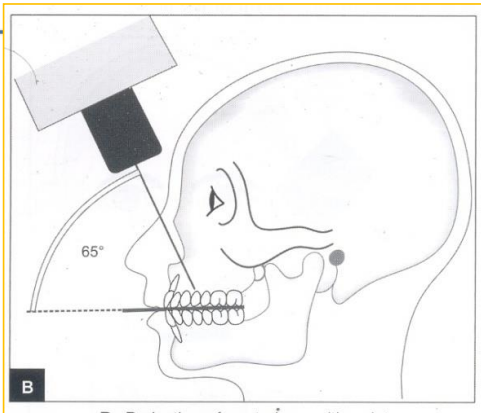
I. Maxillary

1. True /Cross sectional maxillary +65
2. Anterior maxillary occlusal +45
3. Lateral/Topographical +60
4. Vertex Occlusal +90

II. Mandibular

1. Anterior mandibular occlusal - 55
2. Cross-sectional mandibular - 90
3. Lateral/Topographical - 90

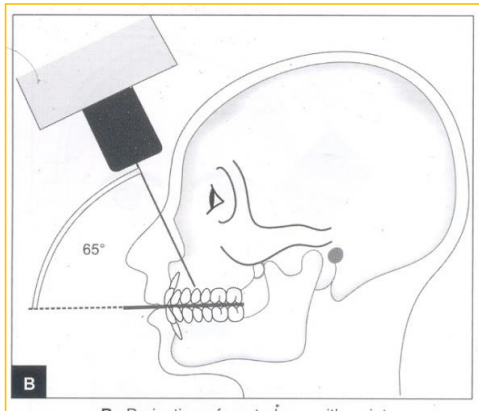
True /Cross sectional Maxillary



B. Projection of central ray with point of entry through the bridge of the nose

C. Maxillary cross-sectional occlusal view

Fig. 11.72: Maxillary cross-sectional view

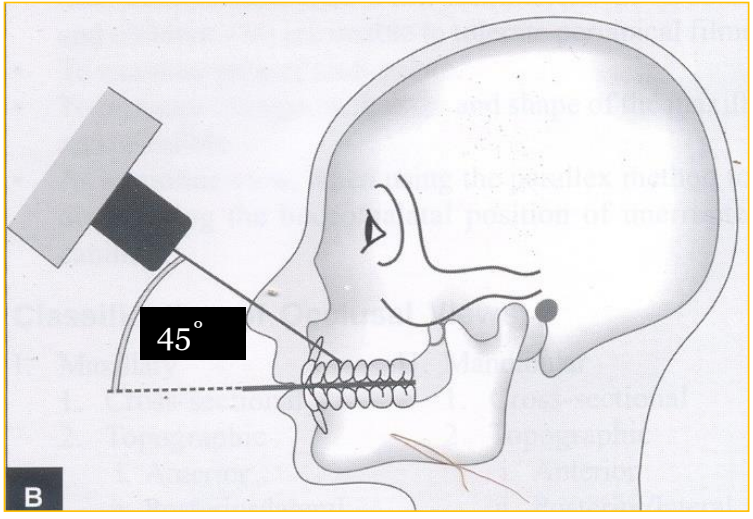


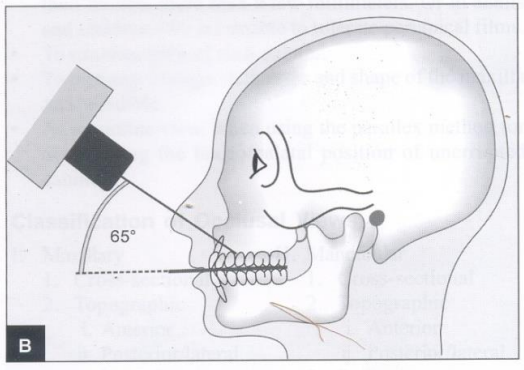
B. Projection of central ray with point of entry through the bridge of the nose

C. Maxillary cross-sectional occlusal view

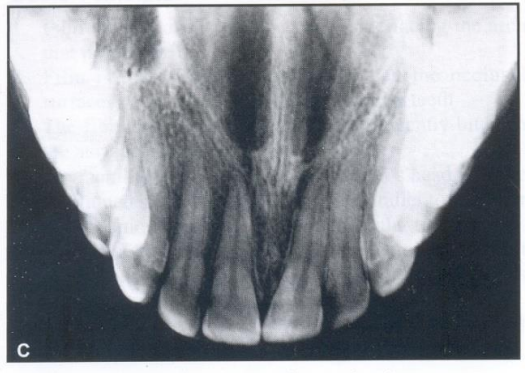
Fig. 11.72: Maxillary cross-sectional view

Anterior Maxillary Occlusal





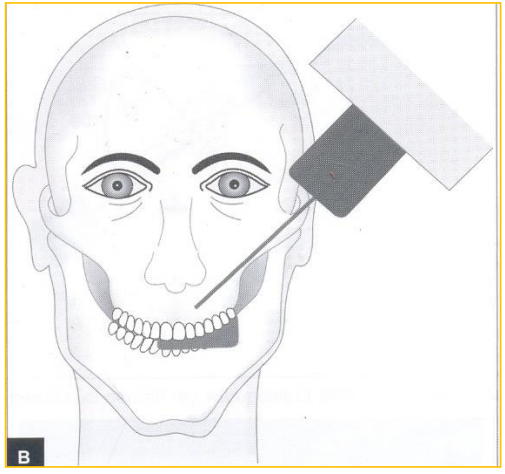
B. Projection of central ray with point of entry through the tip of the nose

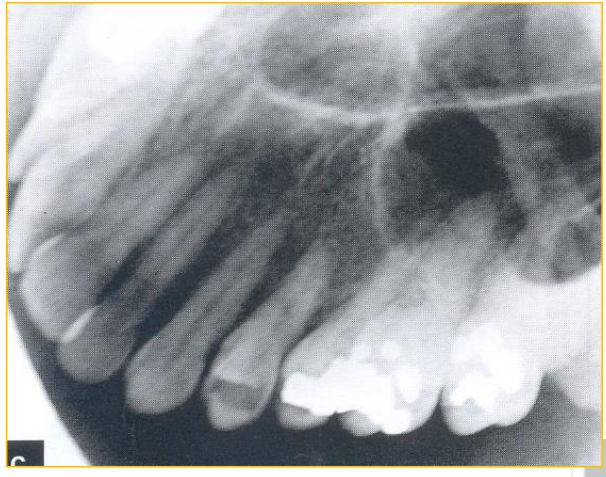


C. Maxillary topographic anterior view

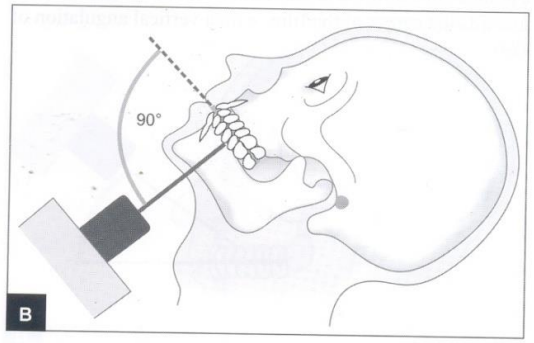
Fig. 11.73: Maxillary topographic anterior

Lateral/Topographical





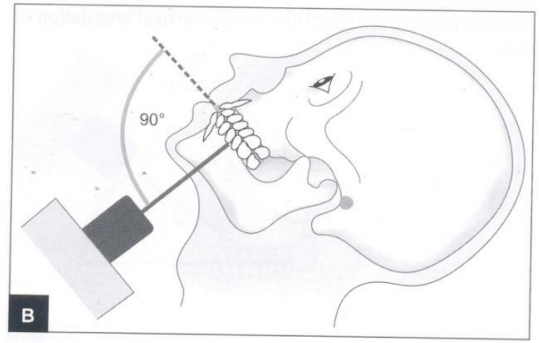
Cross-sectional Mandibular



B. Projection of central ray with point of entry at a point approximately 3 cm below the chin

C. Mandibular cross-sectional view

Fig. 11.75: Mandibular cross section

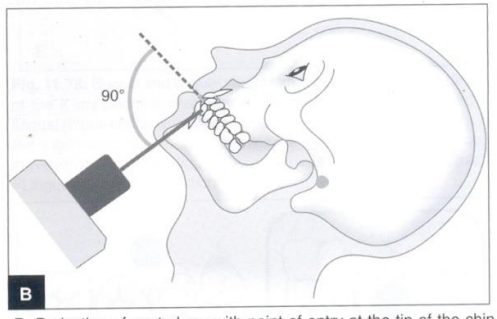


B. Projection of central ray with point of entry at a point approximately 3 cm below the chin

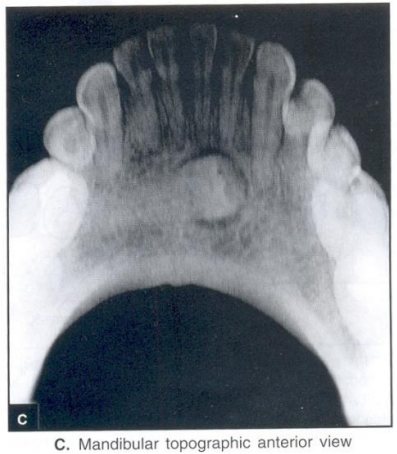
C. Mandibular cross-sectional view

Fig. 11.75: Mandibular cross section

Anterior Mandibular Occlusal

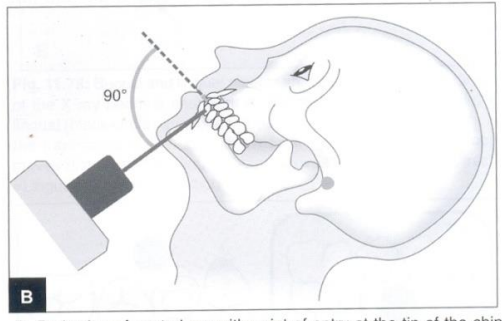


B. Projection of central ray with point of entry at the tip of the chin

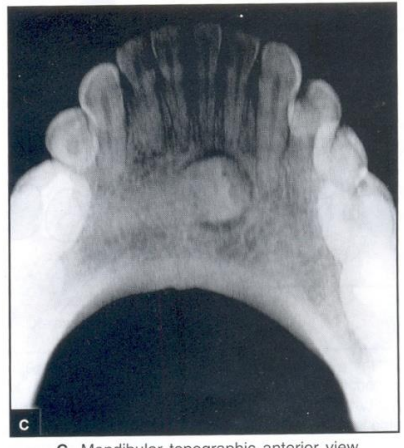


C. Mandibular topographic anterior view

Fig. 11.76: Mandibular topographic anterior



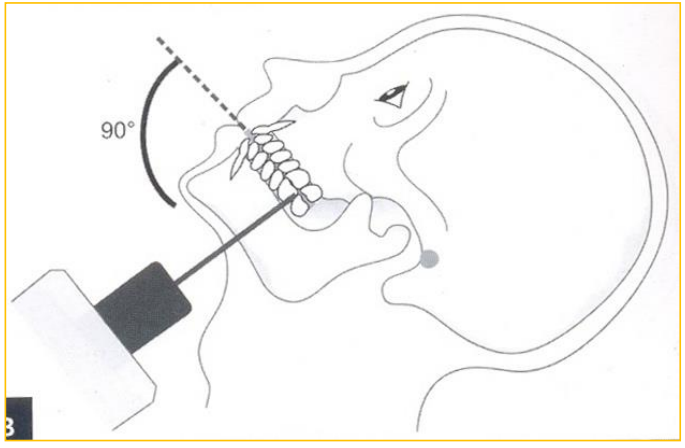
B. Projection of central ray with point of entry at the tip of the chin

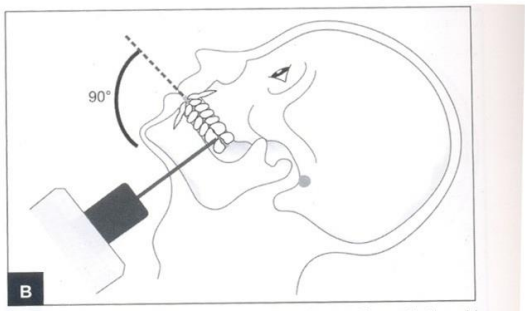


C. Mandibular topographic anterior view

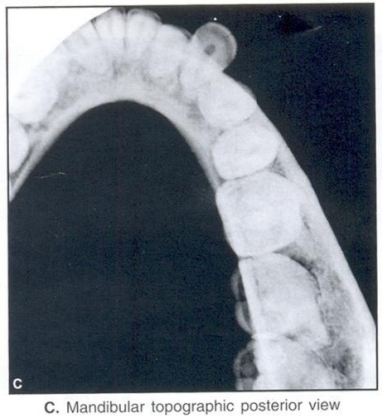
Fig. 11.76: Mandibular topographic anterior

Lateral/Topographical





B. Projection of central ray with point of entry beneath the chin, approximately 3 cm posterior to the chin and approximately 3 cm lateral to the midline



C. Mandibular topographic posterior view

Fig. 11.77: Mandibular topographic posterior

Reference and further reading

- Stuart C. White and Micheal J. Pharoah Oral Radiology, principles and interpretation, 7th Edition.
- Chapter No. 7, page number 91 to 126.