

# Radiology

Lec.13

**Extra oral Radiographic Techniques**

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Extra-oral radiographic examinations include all views made of orofacial regions with film positioned extraorally. The dentist used these views to examine areas not fully covered by intraoral films or to visualize the skull and facial structures (maxilla, mandible and facial bones) or cervical spine for diseases, trauma, or abnormalities.

## ❖ **Lateral jaw Projection:**

Lateral jaw projection is useful to examine the posterior region of the mandible. it is also called lateral oblique view. It's very useful in the diagnosis of fracture or any pathology in patients with restricted mouth opening. Two types of Lateral jaw projections are :

### **1. Body of mandible projection**

It's used in evaluation of impacted teeth , fracture of mandible and to demonstrates the premolar-molar region and the inferior border of the mandible . It provides much broader coverage than is possible with periapical projections.

#### **Technique:**

- The film is kept first against the cheek of the required side and is centered over the body of the mandible. The patients head is titled 15 degree to the side being imaged and the chin is elevated and extended upwards.
- The central x-ray beam is directed perpendicular to the horizontal plane of the cassette with a vertical angulation of -15 to -20 degrees. X-ray beam is directed postero- anteriorly from the opposite side

### **2. Ramus of mandible projection**

It gives a view of the ramus from the angle of the mandible to the condyle . It is very useful for examining the third molar regions of the maxilla and mandible.

#### **Technique:**

- The film is held flat on the cheek of the required side and centered over ramus of mandible. Patients head is tilted 15 degrees towards the required side and the chin is elevated and extended.

- The central x-ray beam should be perpendicular to plane of cassette at vertical angulation of -15 to -20 degrees. X-ray beam is directed posterior-anteriorly from the opposite side.

### ❖ **Skull projections:**

#### **1. Lateral skull Projection (lateral cephalometric projection)**

Cephalometric Radiography or lateral skull projection is used to survey the skull and facial bones for evidence of trauma, disease, or developmental abnormality. Also this view reveals the nasopharyngeal soft tissues, paranasal sinuses, and hard palate. Orthodontists use it to assess facial growth and it is used in oral surgery and prosthetics to establish pretreatment and post treatment records.

All cephalometric radiographs are taken with a **cephalostat** that helps maintain a constant relationship among skull, film and x-ray beam

#### **Technique:**

- The film is positioned parallel to the patient's mid sagittal plane . the site of interest is placed toward the film to minimize distortion.
- X-ray beam is perpendicular to the mid sagittal plane of the patient and the film , centered over the external auditory meatus.

#### **2. Postero-anterior skull projection (PA projection)**

The posteroanterior (PA) projection is so named because the x-ray beam passes in a posterior to- anterior direction through the skull. This projection is used to examine the skull for disease, trauma, or developmental abnormalities . It also provides a good record for detecting progressive changes in the mediolateral dimensions of the skull (facial asymmetry). In addition, the PA projection offers good visualization of facial structures, including the frontal and ethmoid sinuses, nasal fossae, and orbits.

#### **Technique:**

- This radiograph taken with the X-ray source behind the head and the film cassette in front of the patient's face.
- Midsagittal plane of the head is perpendicular to the film
- Forehead and the nose touch the film
- X-ray beam is perpendicular to the film and the patient's coronal plane

### ❖ Water's Projection

The Waters' projection is a variation of the PA view. It is particularly useful for evaluating the maxillary sinuses. In addition, it demonstrates the frontal and ethmoid sinuses, the orbit, the zygomatico-frontal suture, and the nasal cavity.

#### **Technique:**

- Midsagittal plane of the head is perpendicular to the film
- chin touches the film
- X-ray beam is perpendicular to the film

### ❖ Panoramic radiograph

It is a radiologic technique for producing a single image of the facial structures that includes both the maxillary and mandibular dental arches and their supporting structures, used clinically for diagnostic problems requiring broad coverage of the jaws. Common examples include evaluation of trauma, third molars, extensive disease, known or suspected large lesions, tooth development (especially in the mixed dentition), retained teeth or root tips (in edentulous patients), and developmental anomalies.

### ❖ Towne's projection

Towne's view is typically performed with the face toward the x-ray emitting device. This is called the AP (Antero-Posterior) projection. It is helpful to evaluate the occipital (posterior/ back) skull bone.

### ❖ Reverse Towne's view

A reverse Towne's view is simply the reverse with the face away from the emitter. The required beam entry angle for the projection would also be reversed.

It's used to observe fractures involving the condylar neck, and also when displacement of the condyle is suspected, also good visualization of the postero-lateral wall of the maxillary antrum.

## ❖ Submentovertex (SMV) Projection

It helps to identify the position and orientation of the condyles, visualize the base of the skull and evaluate fractures of the zygomatic arch. This projection also demonstrates the sphenoid and the ethmoid sinuses and lateral wall of maxillary sinus. Submentovertex view is of two types :-

### **1. Base of skull projection:**

The cassette is placed perpendicular to the floor with the long axis vertical. The patients head and neck are extended backwards as far as possible. The vertex or top of skull touches the cassette. The head is centered on the cassette. X-ray beam is directed through the centre of the head and perpendicular to centre of the cassette.

### **2. Zygomatic arch projection:**

It is also called as the Jug-Handle view. This radiograph is essentially similar to base of the skull projection with the exception that the radiation exposure and development time are less.

## ❖ Temporo Mandibular Joint Projections

Temporomandibular joint tomography helps in the visualization of the condyle, articular eminence and glenoid fossa. It can be also used to determine the joint space and to evaluate the extent of movement of condyle when the mouth is open.

### **1. Transcranial View**

Transcranial view helps in visualization of superior surface of the condyle and the articular eminence. The joint space is also visualized. The cassette is placed flat over the ear of the required side in such a way that it is centered over the TMJ. The mid sagittal plane is perpendicular to the floor and parallel with the cassette. The central x-ray beam is directed to a point 2 inches superior to and 0.5 inches behind the opening of the ear canal ( external auditory meatus)

### **2. Transorbital view**

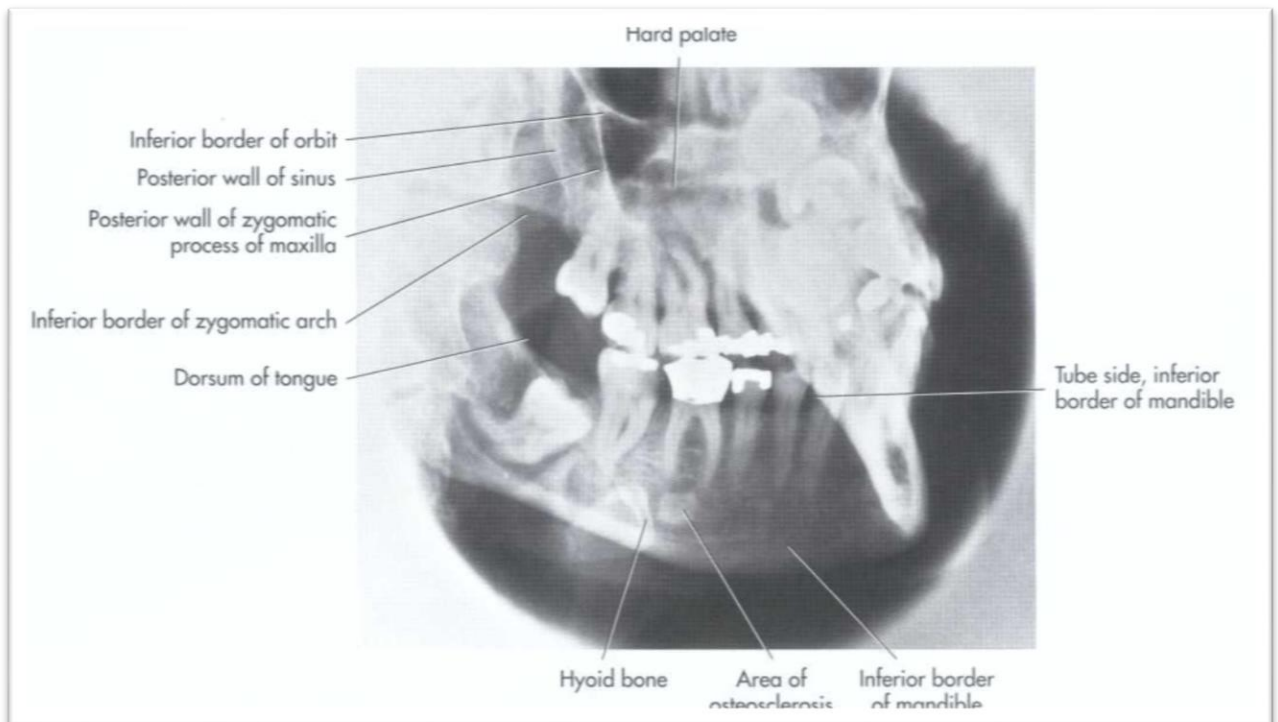
Transorbital view helps in the visualization of the joint with relatively less super imposition. This view is also called Zimmer projection or Trans maxillary projection

This view demonstrates the entire latero-medial articulating surface of both the condyle and the articular eminence and the condylar neck.

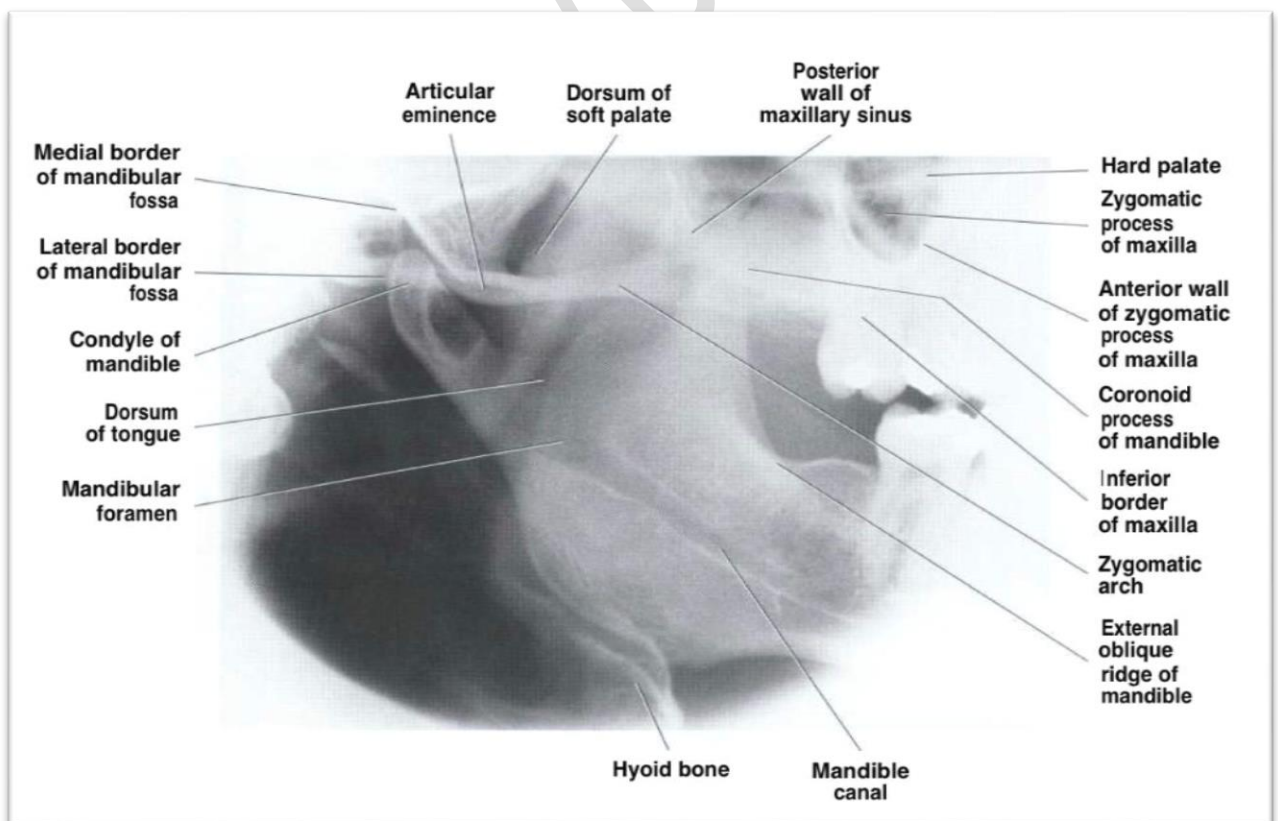
The head of the patient is tipped down 10 degrees in such a way that the canthomeatal line is horizontal. The midsagittal plane is kept at 30 degrees to the central x-ray beam by moving the head to the left for left side projection and to the right for right side projection. The cassette is positioned behind the patients head and the central x-ray beam is directed through the Ipsilateral orbit and through the required TMJ, exiting from the skull behind the mastoid process. During the exposure, the patient is asked to open the mouth as wide as possible.

### **3. Transpharyngeal view**

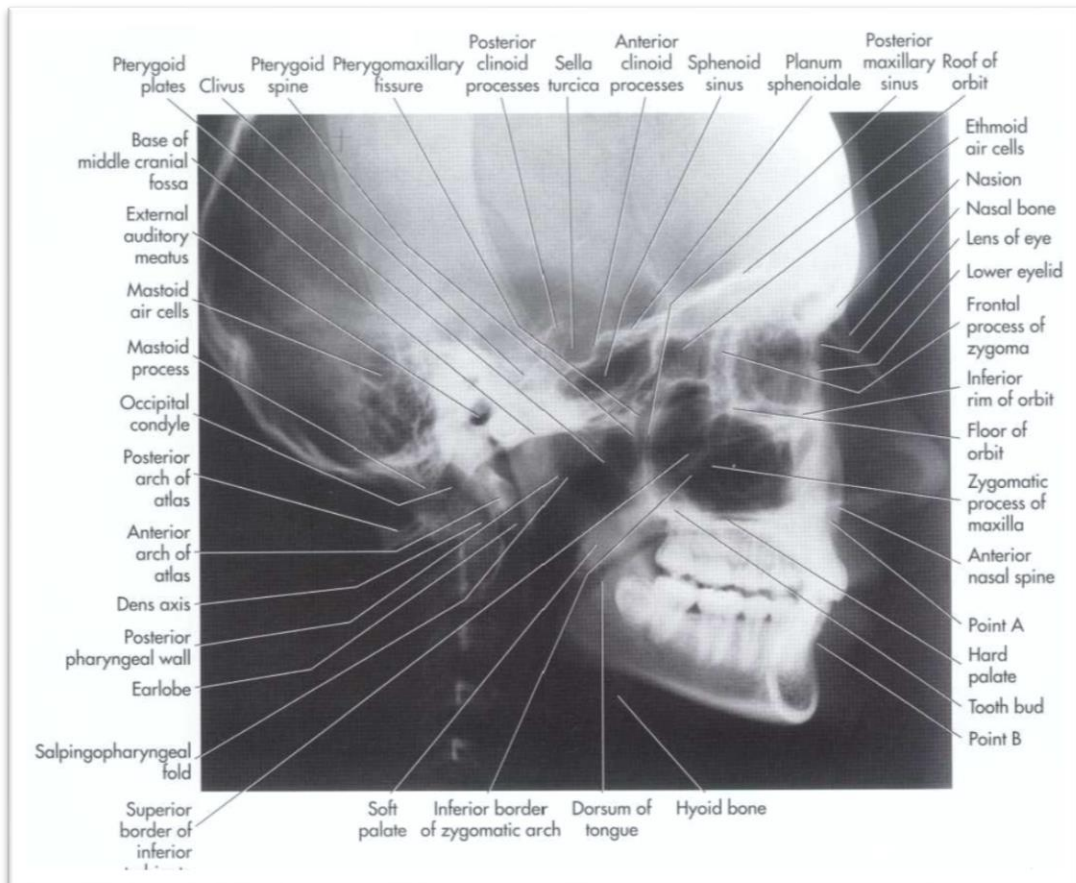
This projection demonstrates the angular process from the mid mandibular ramus to the condyle. This technique helps in the diagnosis of fractures of the condyle and the condyle neck and in detecting alterations in condyle morphology. The cassette is held over the ear in such a way that the TMJ of interest is in the centre of the cassette. The cassette is held parallel to the mid sagittal plane. The x-ray tube is kept on the side of the skull opposite to the TMJ imaged. It is angled in such a way that the mouth wide so that the central x-ray beam enters through the tube side sigmoid notch, below the skull base and oropharynx.



**Fig 1: Body of mandible projection**



**Fig 2: Ramus of mandible projection**



**Fig 3: Cephalometric radiograph (lateral skull projection)**

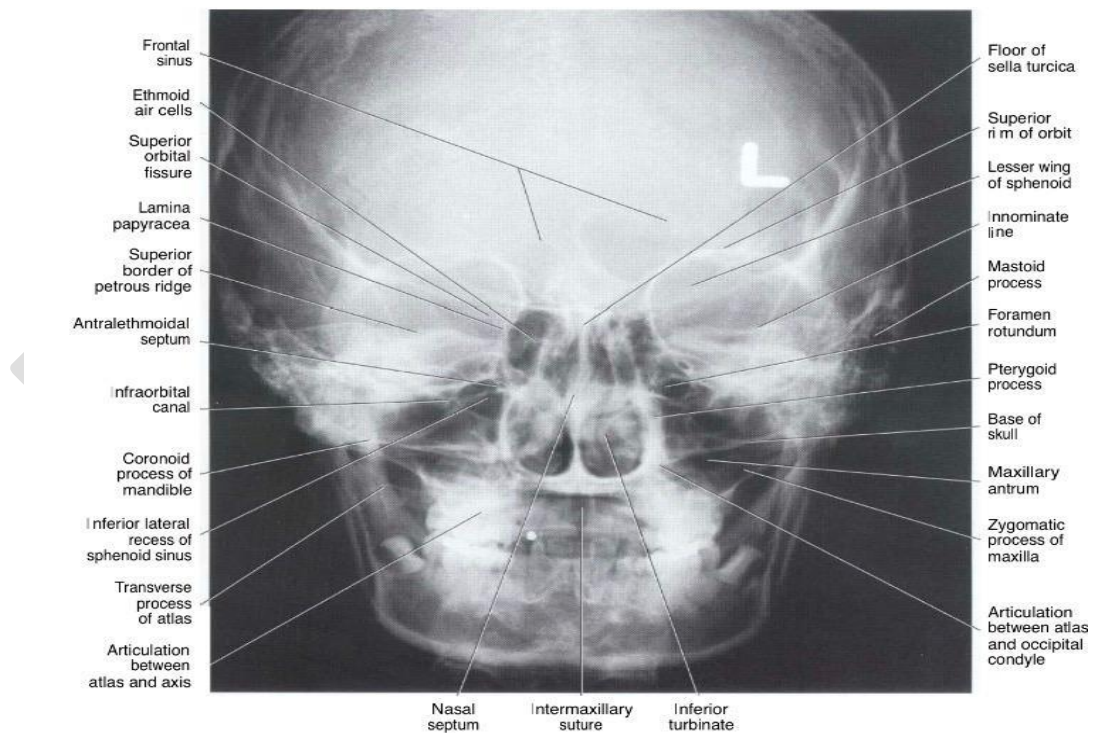
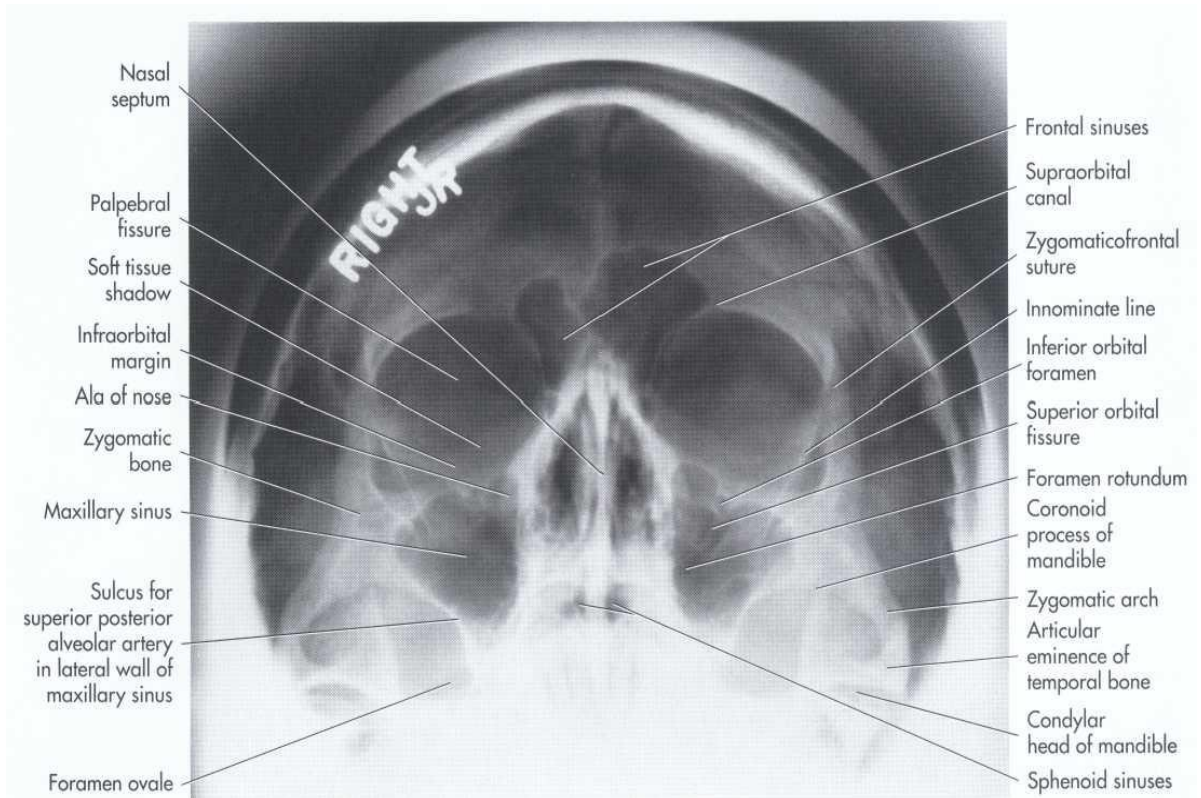


FIG. 10-1 Posteroanterior (PA) cephalometric projection of the skull.

**Fig 4: Posteroanterior (PA) cephalometric radiograph**

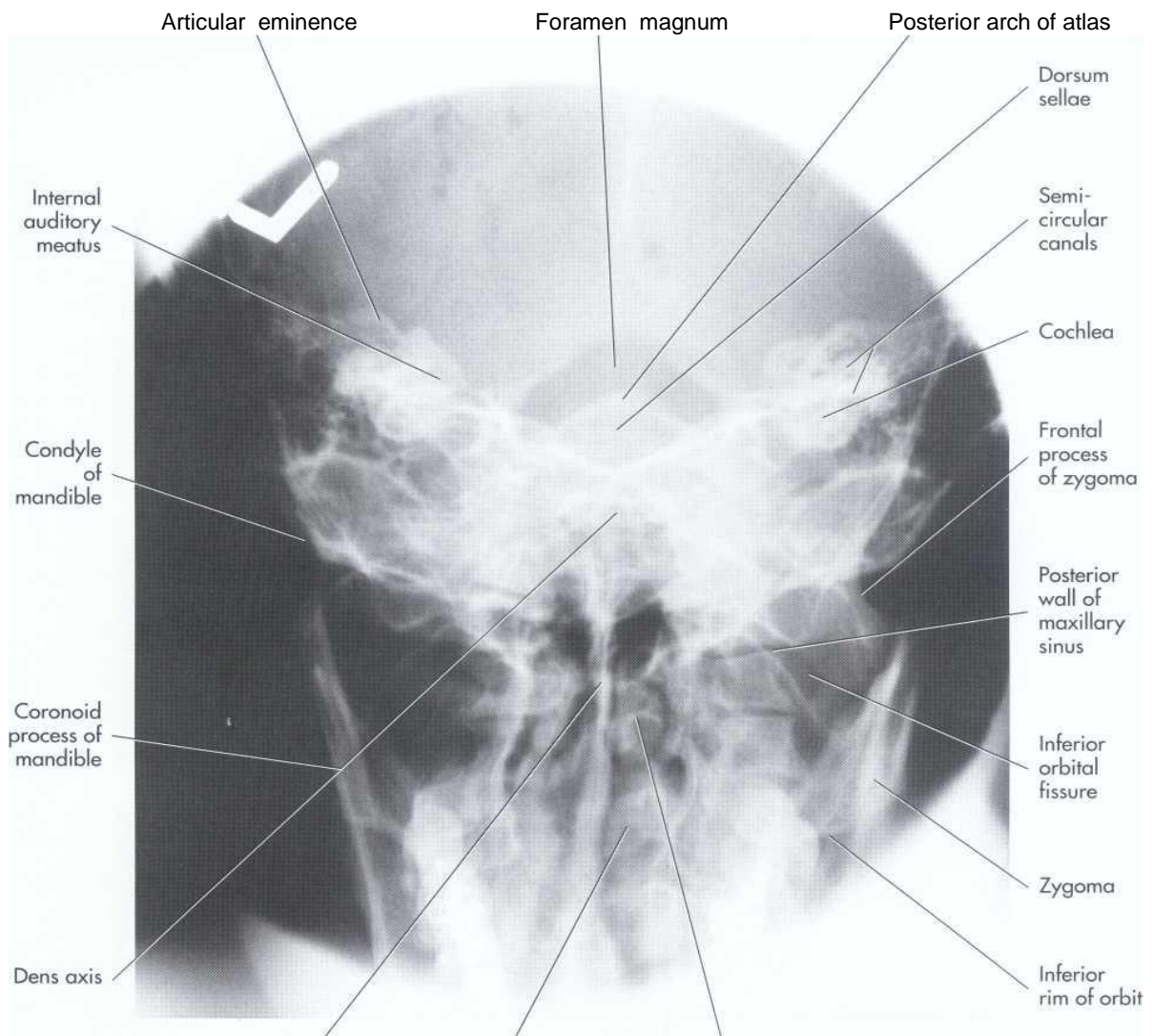


**Fig 5: Water's projection**



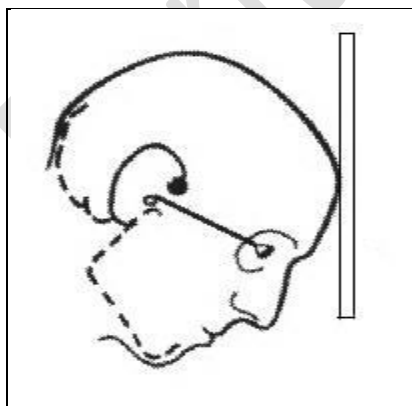
**Fig 6: Panoramic radiography or orthopantomography (OPG)**



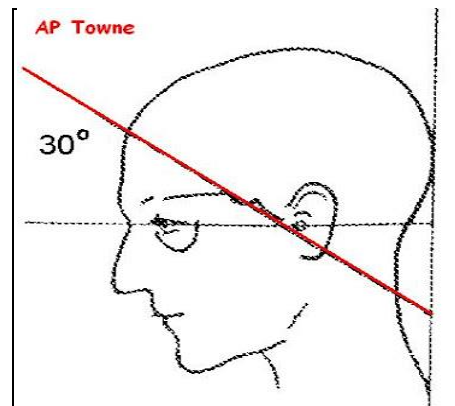


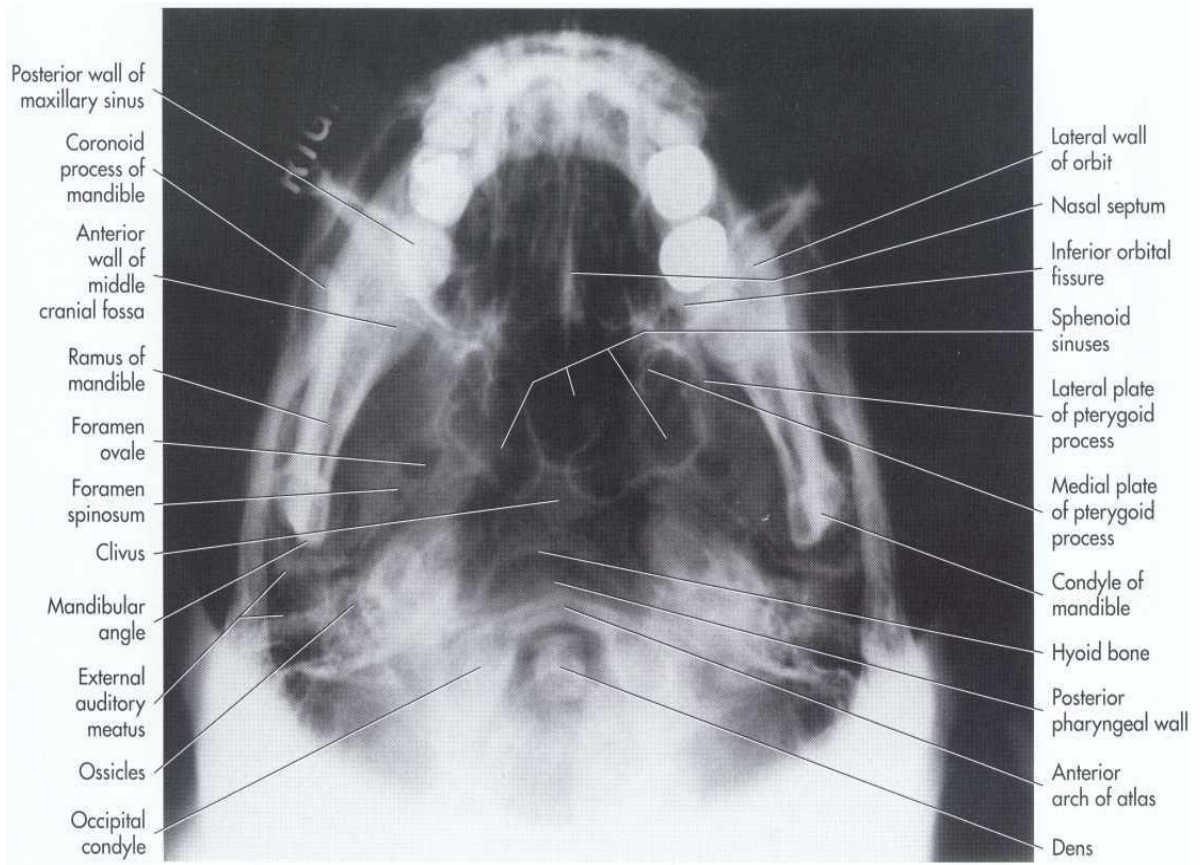
**Fig 7: Reverse Towne's projection**

**Reverse Towne's view**

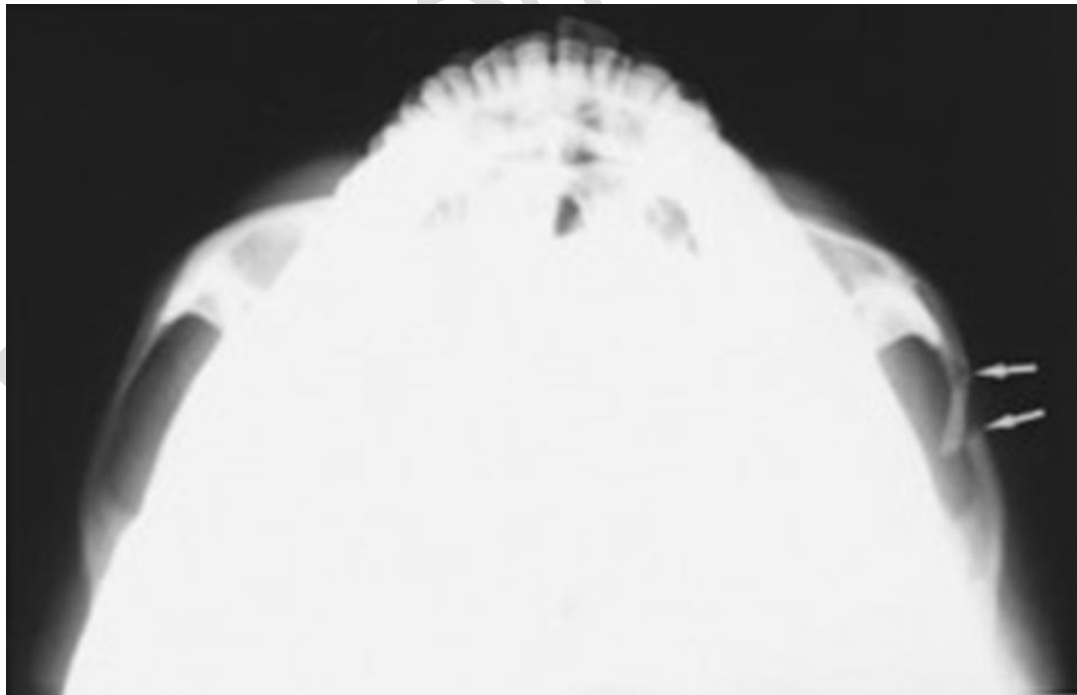


**Towne's view (AP)**





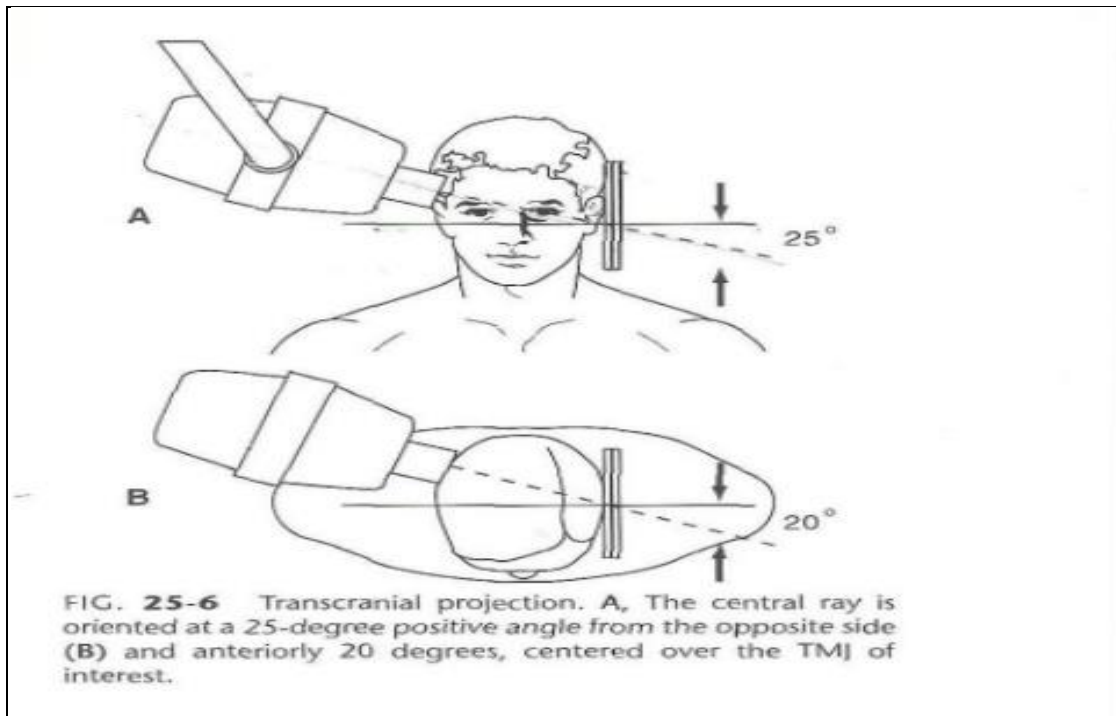
**Fig 8: Submentovertex view**



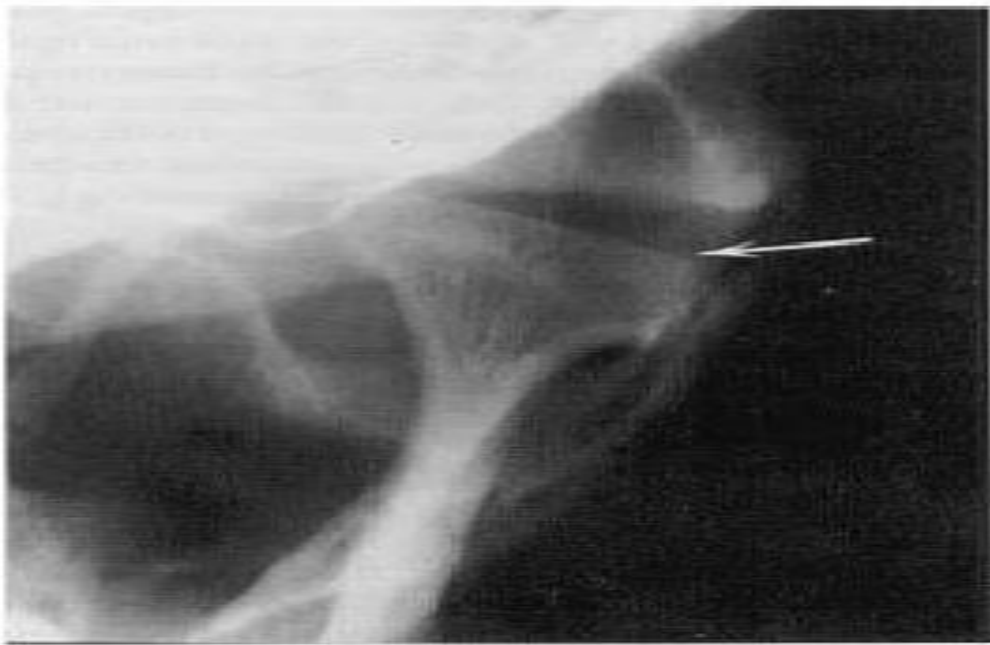
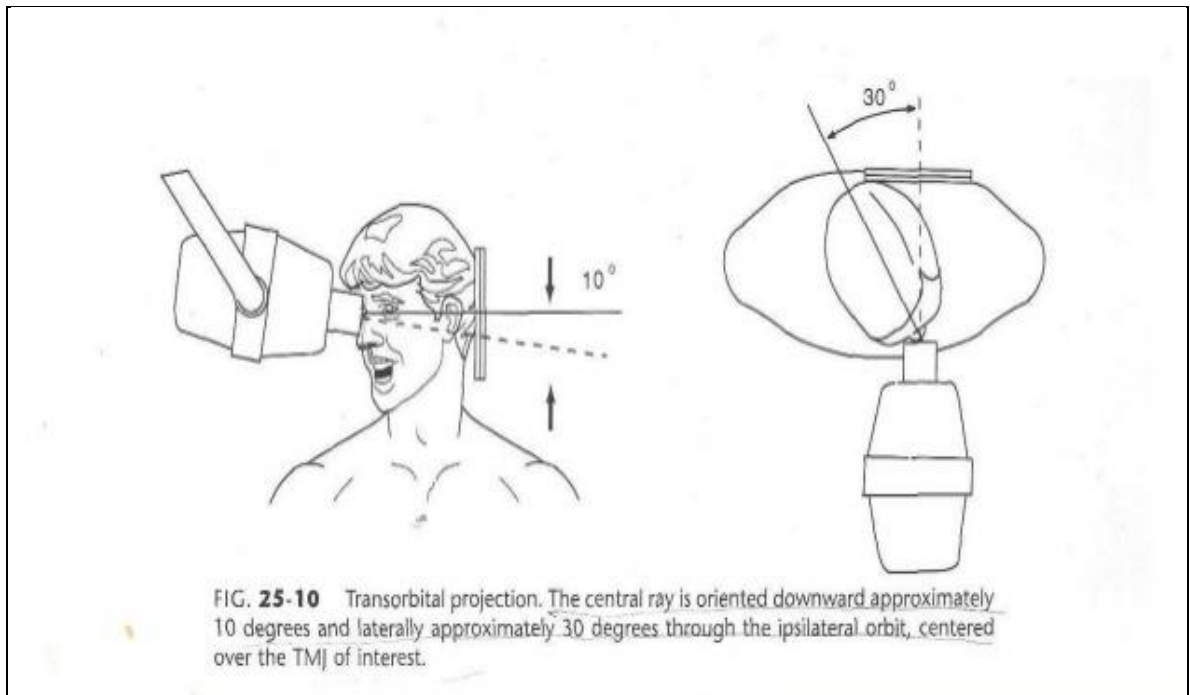
**Fig 9: Jug – handle view**

**TMJ Projections :**

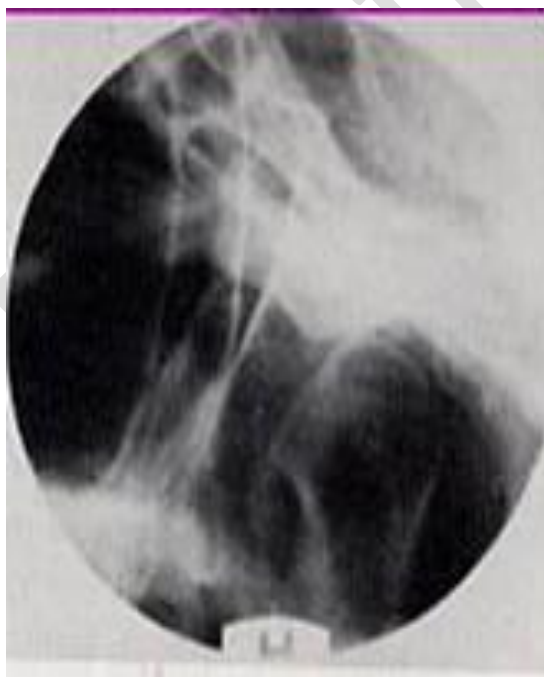
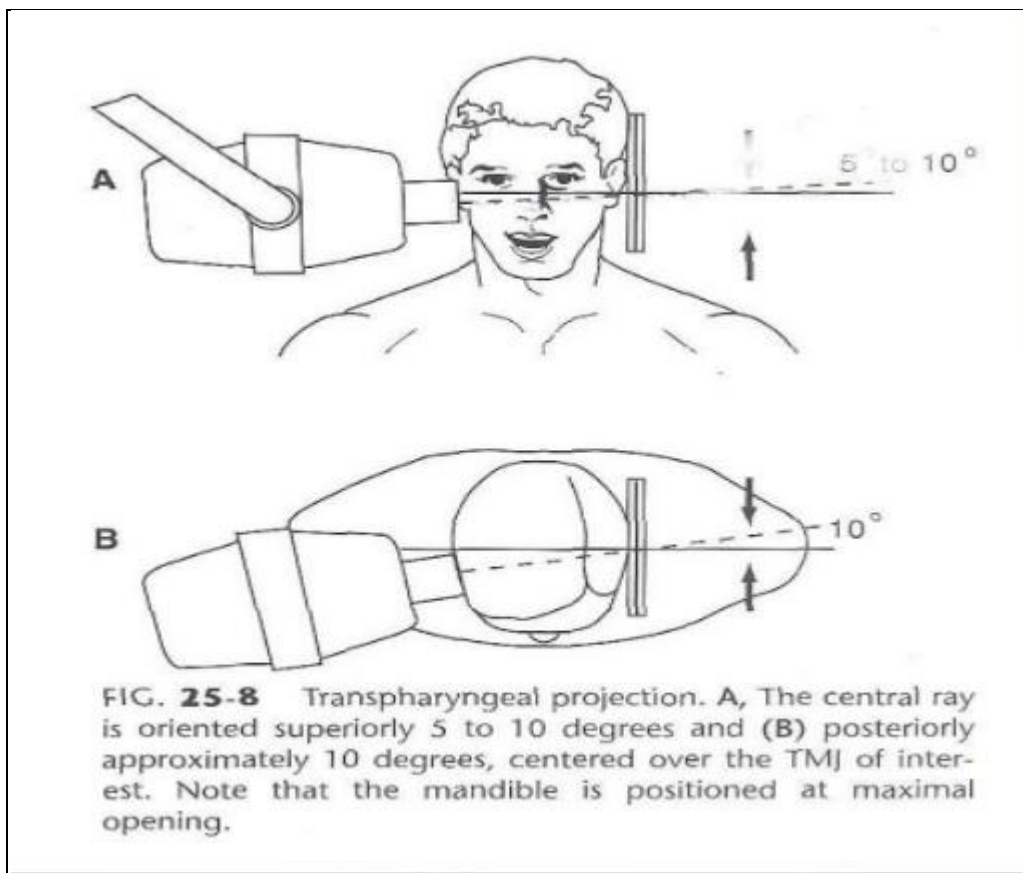
**Transcranial view**

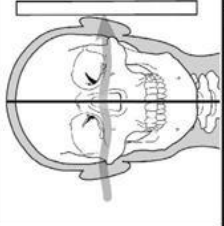
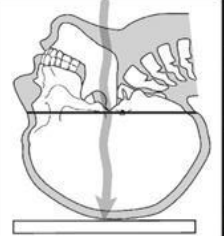
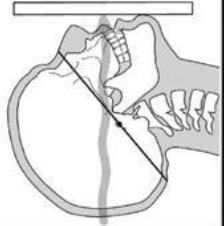
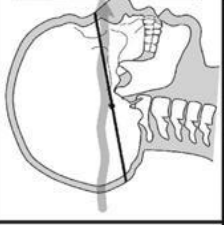
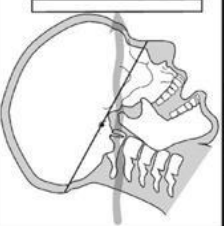






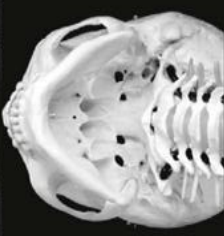




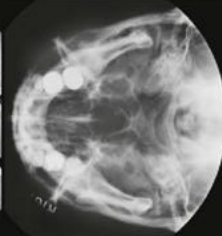
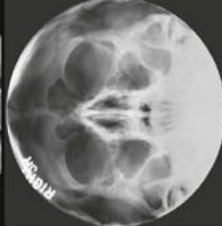

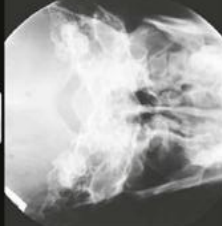


## Transorbital view



**Transpharyngeal view ( Infracranial view or McQueen projection)**



|  | LATERAL CEPH  | SMV   | WATERS   | PA CEPH   | REVERSE TOWNE   |
|--|---|---|--|---|---|
| <b>Patient placement</b>                 | Film parallel to midsagittal plane  | Canthomeatal line parallel to film  | Canthomeatal line at 37° with film   | Canthomeatal line at 10° with film  | Canthomeatal line at -30° with film   |
| <b>Central beam</b>                      | Beam perpendicular to film  | Beam perpendicular to film  | Beam perpendicular to film   | Beam perpendicular to film  | Beam perpendicular to film  |
| <b>Diagram of patient placement</b>      |    |    |    |    |    |
| <b>Illustration of patient placement</b> |    |    |    |    |    |
| <b>Skull view</b>                        |   |   |   |   |   |
| <b>Resultant image</b>                   |  |  |  |  |  |