Radiographic Techniques 2

lecture 2

Skull AP, lateral, townes and basal view

By

Ali Hani Karim

Master of Radiography Techniques /2021

Skull AP, Lateral, townes and basal view

1. Lateral – supine with horizontal beam

Position of patient and image receptor

• The patient lies supine with the head raised and immobilised on a non-opaque skull pad. This will ensure the occipital region is included on the image.

• The head is adjusted such that the median sagittal plane is parallel to the Bucky/receptor and the interorbital line is perpendicular to the image receptor.

• The image receptor is supported vertically against the lateral aspect of the head parallel to the median sagittal plane with its edge 5 cm above the vertex of the skull.

Direction and location of the X-ray beam

• The collimated horizontal beam is directed parallel to the interorbital line and at right-angles to the median sagittal plane.

• The centring point is midway between the glabella and the external occipital protuberance to a point approximately 5 cm superior and posterior to the EAM.

Figure (1.a): Lateral – supine with horizontal beam

Essential image characteristics

• The image should contain all of the cranial bones and the 1st cervical vertebrae.

• A true lateral will result in superimposition of lateral floors of the cranial fossa.

• The clinoid processes of the sella turcica should also be superimposed.

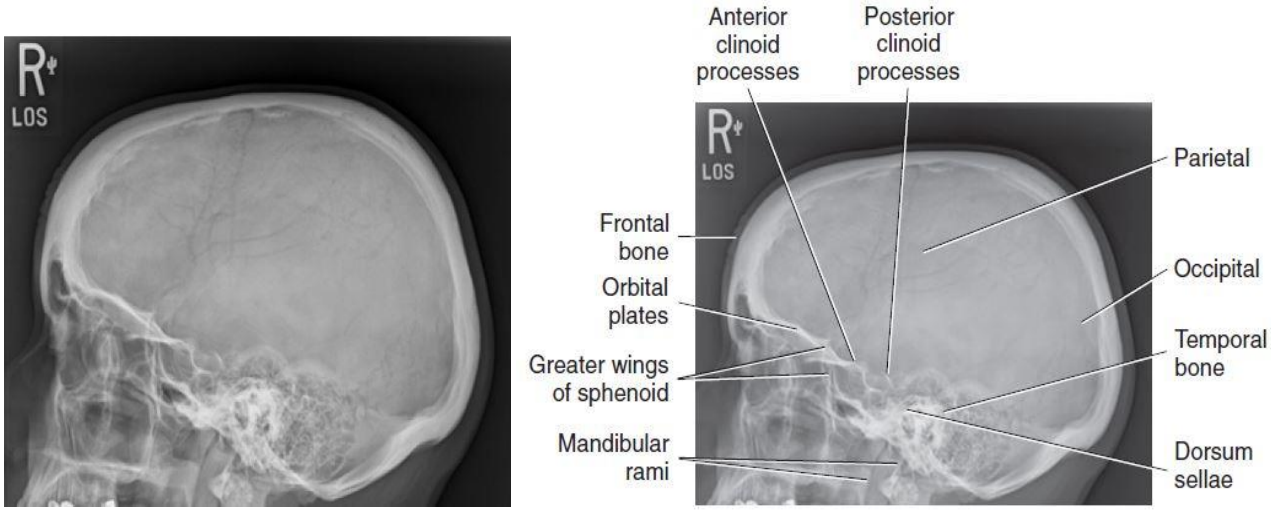

Figure (1.b): Lateral – supine with horizontal beam

Common faults and solutions

• Failure to include the occipital region as a result of not using a pad to ensure the head is elevated adequately from the trolley surface.

• Poor superimposition of the lateral floors of the cranial fossa. Always ensure the interobital line is perpendicular to the cassette/receptor and the median sagittal plane is perpendicular to the trolley surface.

2. Lateral erect (Fig 2)

This position may be used for a cooperative patient. Variations from the supine horizontal beam technique are noted below but all other imaging criteria remain the same.

Position of patient and image receptor

• The patient sits facing the erect Bucky/receptor and the head is then rotated such that the median sagittal plane is parallel to the Bucky/receptor and the interpupillary line is perpendicular to the Bucky/ receptor.

• The shoulders may be rotated slightly to allow the correct position.

• Position the image receptor transversely such that its upper border is 5 cm above the vertex of the skull.

Figure (2): Lateral erect projection of the skull

Direction and location of the X-ray beam

• The X-ray tube should be centred to the Bucky/image receptor and adjust the height of the Bucky for patient comfortable.

• The collimated horizontal beam is directed parallel to the interorbital and at right-angles to the median sagittal plane.

• The centring point is midway between the glabella and the external occipital protuberance to a point approximately 5 cm superior and posterior to the EAM.

Essential image characteristics

• The image should contain all of the cranial bones and the 1st cervical vertebrae.

• A true lateral will result in superimposition of lateral floors of the cranial fossa.

• The clinoid processes of the sella turcica should also be superimposed.

Common faults and solutions

• This is not an easy position for the patient to maintain. Check the position of all planes immediately prior to the exposure; the patient may have moved.

3. Towne's projection (Half axial, fronto-occipital 30°caudal)

Position of patient and image receptor

• The patient lies supine on a trolley (or X-ray table) with the posterior aspect of the skull resting on an image receptor/ grid cassette.

• The head is adjusted to bring the median sagittal plane at right-angles to the image receptor.

• The orbito-meatal baseline should be perpendicular to the image receptor.

Direction and location of the X-ray beam

• The collimated vertical beam is angled 30° caudally to the orbito-meatal plane.

• The top of the receptor should be positioned adjacent to the vertex of the skull to ensure the beam angulation does not cut off the area of interest bottom of the image.

• Center at median sagittal plane (6.5 cm) above the glabella to pass through the foramen magnum.

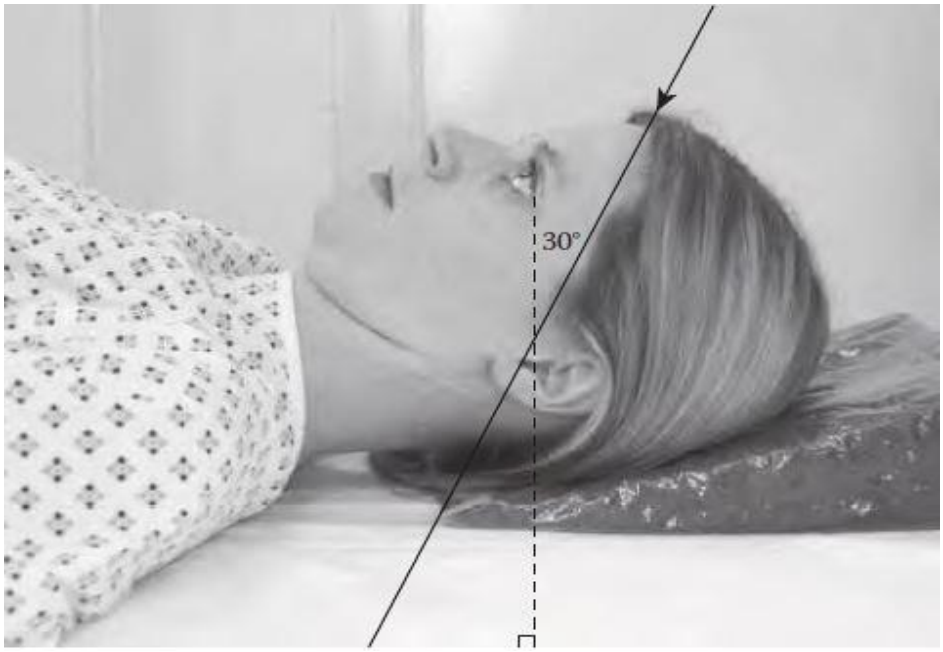

Figure (3.a): Towne's projection

Essential image characteristics

• The sella turcica of the sphenoid bone is projected to appear within the foramen magnum.

• The skull should not be rotated. This can also be assessed by ensuring the sella turcica appears centrally in the foramen magnum.

• The image must include all of the occipital bone and the posterior parts of the parietal bone and the lambdoidal suture.

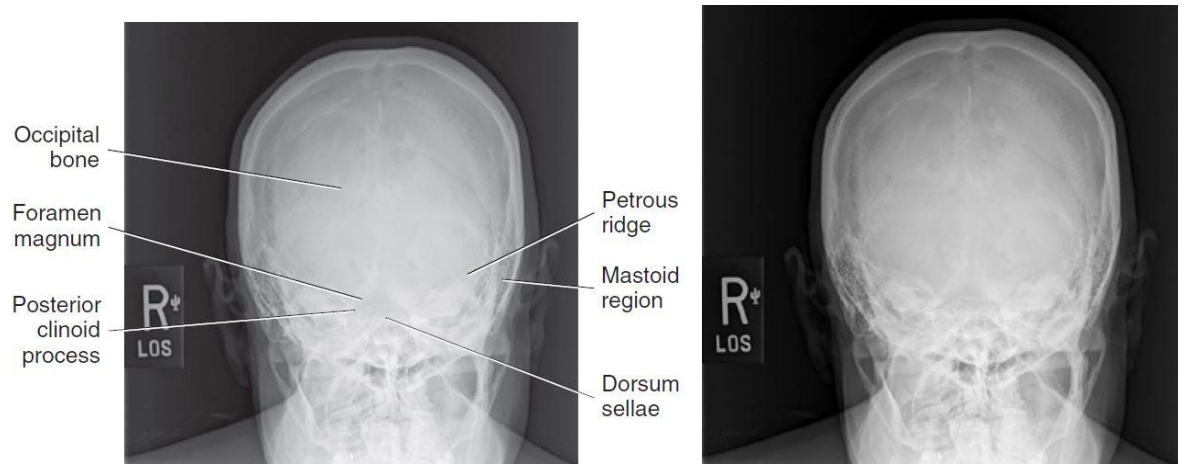

Figure (3.b): Towne's projection

Common faults and solutions

• Under angulation: the foramen magnum is not clearly demonstrated above the petrous ridges.

• If the patient's chin cannot be sufficiently depressed to bring the orbito-meatal baseline perpendicular to the image receptor then it will be necessary to increase the angulation of the tube to more than 30° to the vertical. A 30° angle to the orbito-meatal plane must be maintained.

• Over angulation: the posterior arch of the atlas bone (C1) is visible within the foramen magnum.

• The large tube angle introduces a significant degree of distortion in the resultant image.

• Some patients, particularly those with an increased thoracic kyphosis may have difficulty in positioning their back against the image receptor. This can be somewhat overcome by angling the Bucky/image receptor.

4. Fronto-occipital (AP)

Position of patient and image receptor

• The patient lies supine on the trolley (or X-ray table) with the posterior aspect of the skull resting on the image receptor/ grid cassette.

• The head is adjusted to bring the median sagittal plane at right-angles to the image receptor and coincident with its midline. In this position the EAMs are equidistant from the image receptor to ensure no rotation.

• The orbito-meatal baseline should be perpendicular to the image receptor.

Direction and location of the X-ray beam

• The collimated vertical X-ray beam is directed perpendicular to the image receptor along the median sagittal plane.

• The collimated field should be set to include the vertex of the skull superiorly, the base of the occipital bone inferiorly and the lateral skin margins.

Figure (4): Fronto-occipital (AP) of the skull

Essential image characteristics

• All the cranial bones should be included within the image including the skin margins.

• It is important to ensure the skull is not rotated. This can be assessed by measuring the distance from a point in the midline of the skull to the lateral margin. If this is the equidistant from both sides of the skull then it is not rotated.

Common faults and solutions

• Rotation: ensure the patient has maintained their position immediately before the exposure is made.

5. Submento-vertical

Position of patient and image receptor

The patient may be imaged erect or supine. If the patient is unsteady then a supine technique is advisable as this is a difficult position to maintain.

Supine:

• The patient's shoulders are raised and neck hyperextended to bring the vertex of the skull in contact with the image grid cassette (or X-ray table).

• The head is adjusted to bring the EAMs equidistant from the image receptor.

• The median sagittal plane should be at right-angles to the image receptor along its midline.

• The orbito-meatal plane should be as near as possible parallel to the image receptor.

Erect:

• The patient sits facing the X-ray tube a short distance away from the vertical Bucky/ receptor.

• The neck is hyperextended to allow the head to fall back until the vertex of the skull makes contact with the centre of the vertical Bucky.

• The head is adjusted to bring the EAMs equidistant from the image receptor.

• The median sagittal plane should be at right-angles to the image receptor along its midline.

• The orbito-meatal plane should be as near as possible parallel to the image receptor.

Direction and location of the X-ray beam

• The collimated perpendicular beam is directed at right angles to the orbito-meatal plane and centred midway between the external auditory meatuses.

Figure (5.a): Submento-vertical projection of the skull

Essential image characteristics

• An optimum projection will demonstrate the mandibular angles clear of the petrous portions of the temporal bone.

• The foramina of the middle cranial fossa should be seen symmetrically either side of the midline.

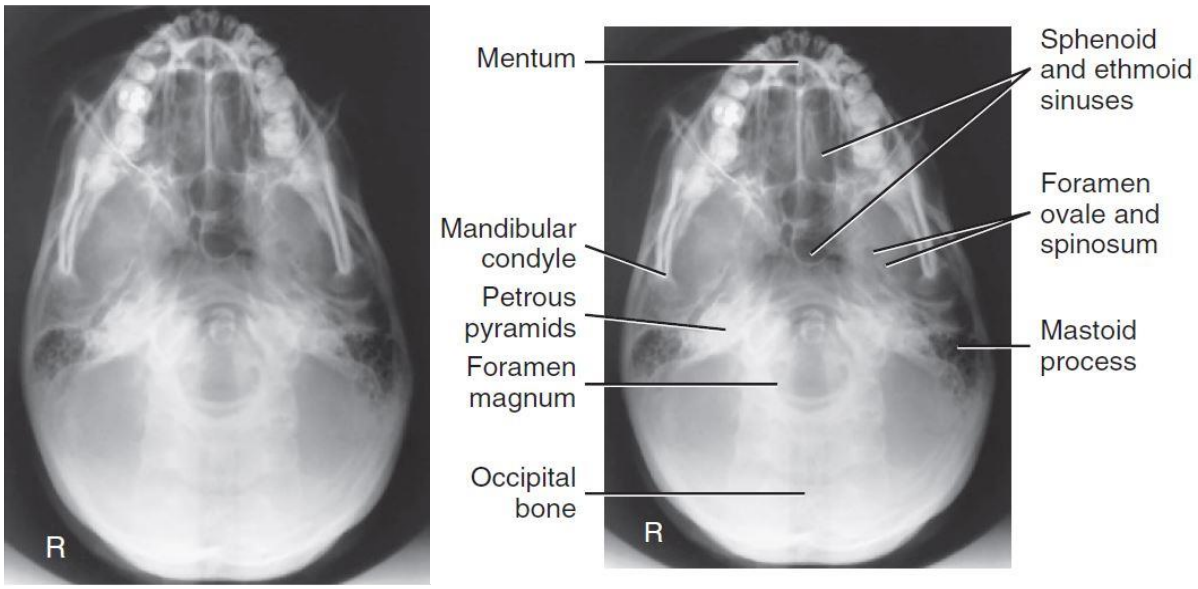

Figure (5.b): Submento-vertical projection of the skull

Common faults and solutions

• This projection involves positioning that can be very uncomfortable for the patient. It is important to ensure the equipment is fully prepared before the examination so the patient need only maintain the position for a minimum period.