Skull

All radiography of the skull is undertaken with reference to a series of palpable/visible landmarks and recognized lines or planes of the skull and face. It is vital that the radiographer possesses a good understanding of these before undertaking any radiographic positioning.

Landmarks

Outer canthus of the eye: the lateral point where the upper and lower eyelids meet.
Infraorbital margin/point: the lowest point of the inferior rim of the orbit
Nasion: the articulation between the nasal and frontal bones.
Glabella: a bony prominence found on the frontal bone immediately superior to the nasion.
Vertex: the highest point of the skull in the median sagittal plane.
External occipital protuberance (inion): a bony prominence found on the occipital bone, usually coincident with the median sagittal plane.
External auditory meatus (EAM): the opening within the ear that leads into the external auditory canal.

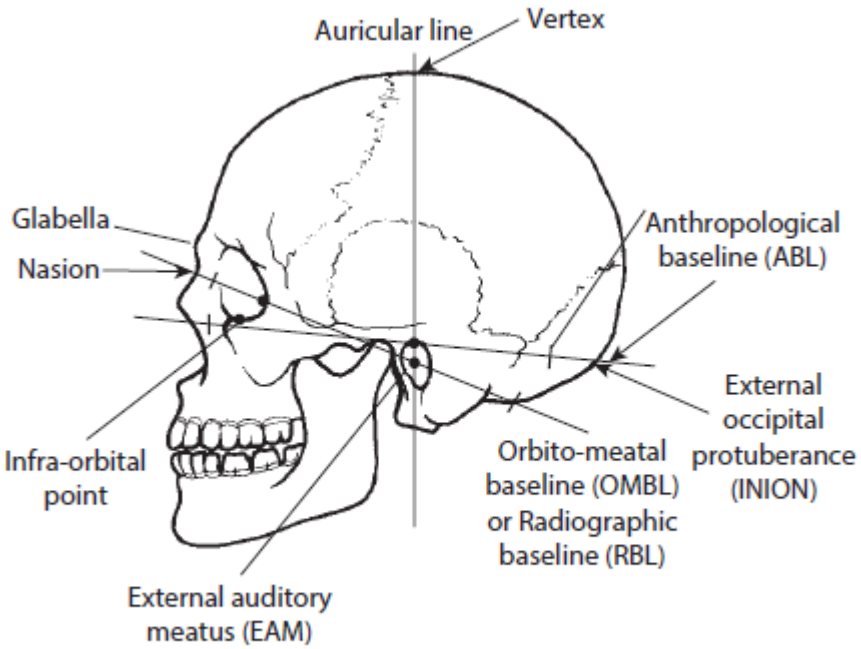


Fig. 8.1c Lateral diagram showing primary positioning lines and landmarks.

Lines

Interpupillary (interorbital) line: joins the centre of the two orbits or the centre of the two pupils when the eyes are looking straight forward.
Infraorbital line: joins the two inferior infraorbital points.
Anthropological baseline: passes from the infraorbital point to the upper border of the EAM.

Orbito-meatal baseline (radiographic baseline): extends from the outer canthus of the eye to the centre of the EAM. This is angled approximately 10° to the anthropological baseline.

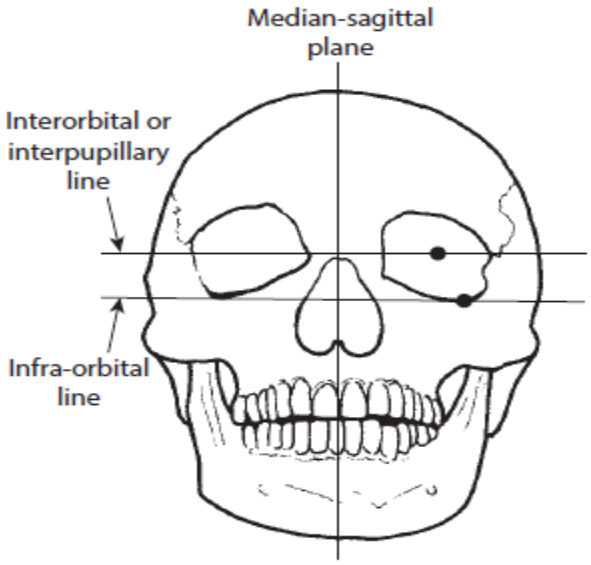


Fig. 8.1d Frontal line diagram of skull showing primary positioning lines.

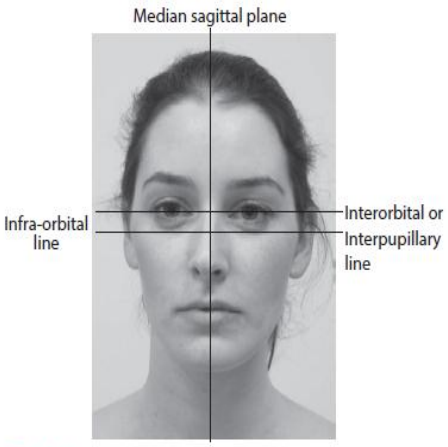
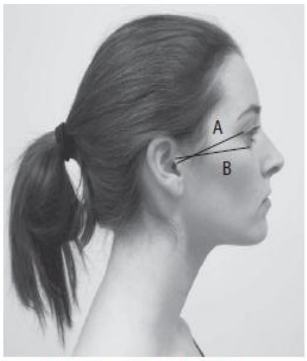


Fig. 8.1b Frontal photograph of the head showing primary positioning lines.



A = Orbito-meatal or Radiographic baseline (RBL)
B = Anthropological baseline

Fig. 8.1e Lateral photograph of the head showing primary positioning lines.

Planes

Median sagittal plane: divides the skull into right and left halves. Landmarks on this plane are the nasion anteriorly and the external occipital protuberance (inion) posteriorly.

Coronal planes: are at right-angles to the median sagittal plane and divide the head into anterior and posterior parts.

Anthropological plane: a horizontal plane containing the two anthropological baselines and the infraorbital line. It is an example of an axial plane.

Auricular plane: perpendicular to the anthropological plane and passes through the centre of the two EAMs. It is an example of a coronal plane. The median sagittal, anthropological and coronal planes are at right-angles.

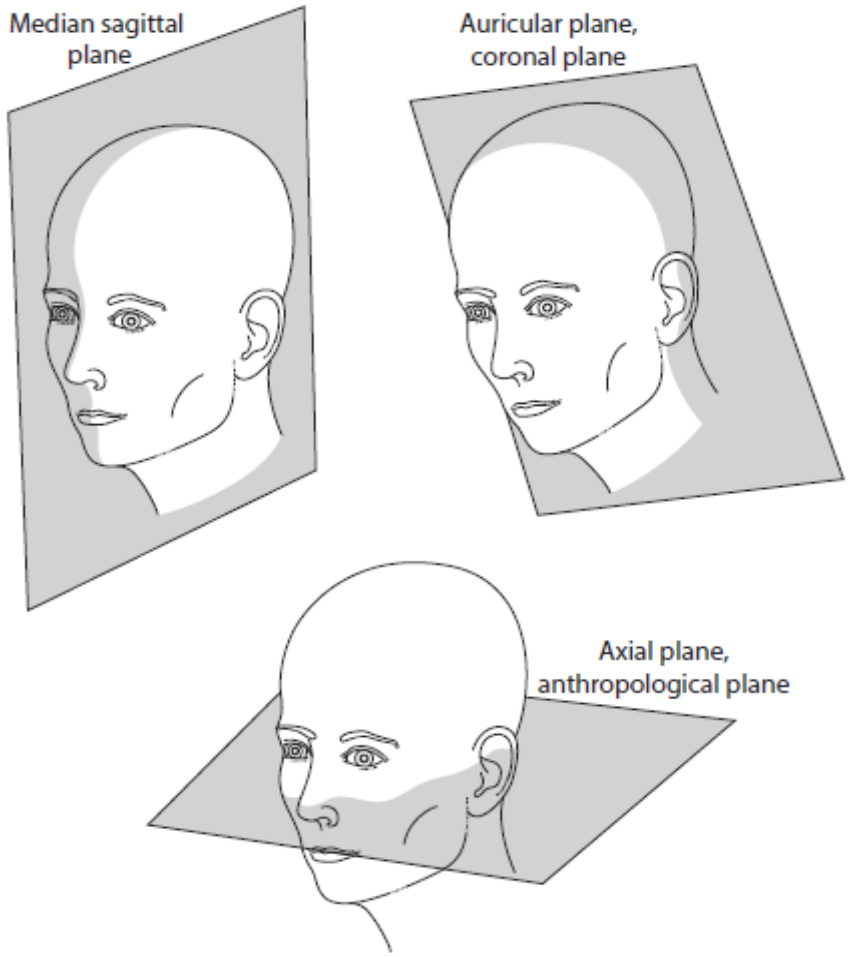


Fig. 8.1a Diagram of planes.

In order to evaluate radiographs successfully it is important to be aware of a range of anatomical features demonstrated on the standard skull projections. This will enable a judgement to be made in relation to the quality of the radiograph with respect to positioning.

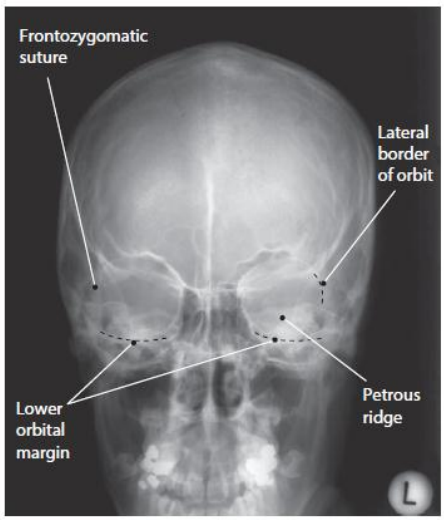


Fig. 8.2a OF radiograph showing anatomical features.

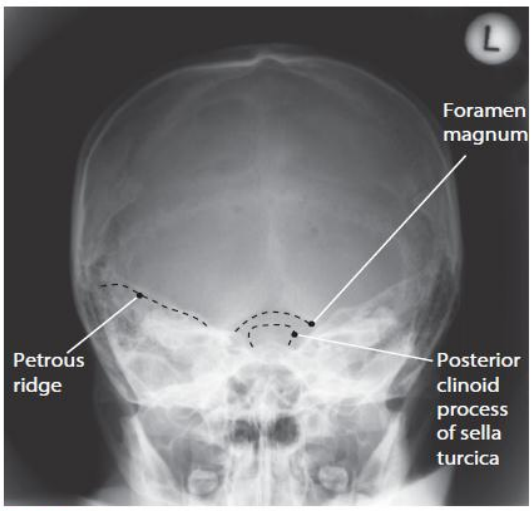


Fig. 8.2b FO 30° radiograph showing anatomical features.

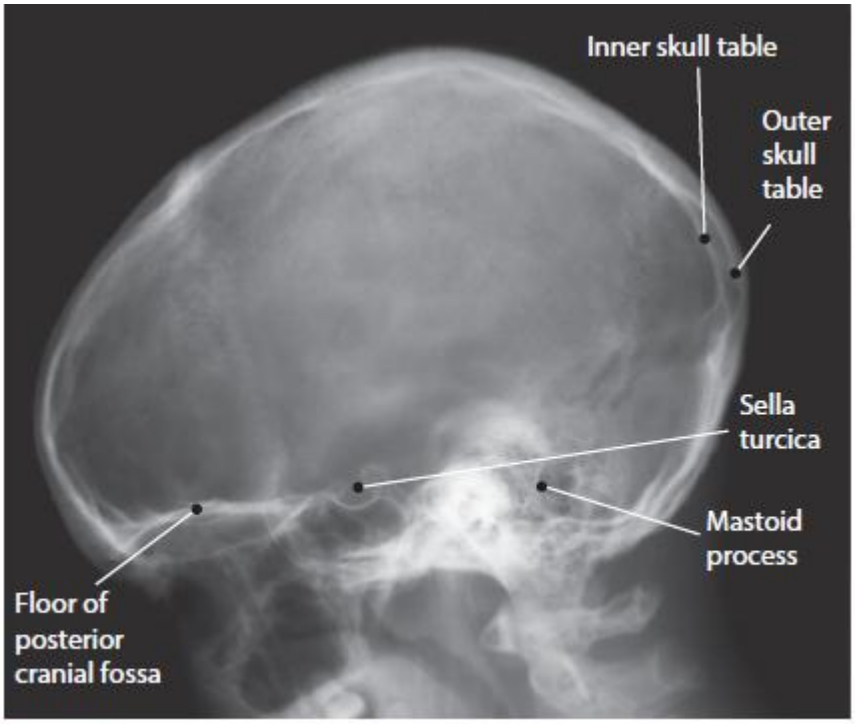


Fig. 8.2c Lateral radiograph showing anatomical features.

Positioning terminology

To describe a skull projection it is necessary to state the relative positions of the skull planes to the image receptor, the central ray relative to skull planes/image receptor and give a centring point or area to be included within the collimated X-ray beam.

Occipto-frontal projection

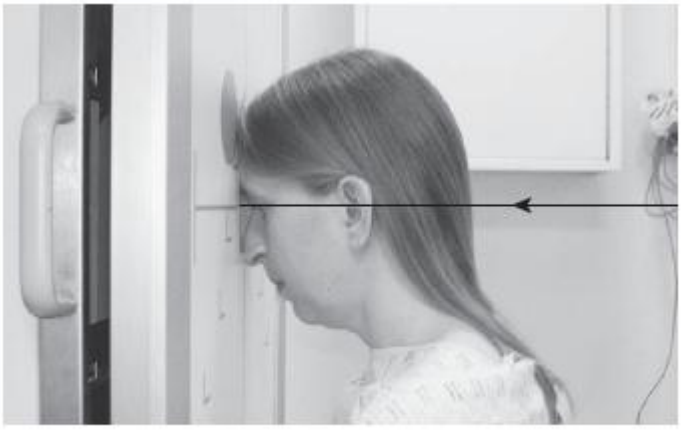


Fig. 8.4a Head position for OF projection.

In the photograph above the central ray enters the skull through the occipital bone and exits through the frontal bone. This is therefore an occipto-frontal (OF) projection (Fig. 8.4a).

Fronto-occipital projection

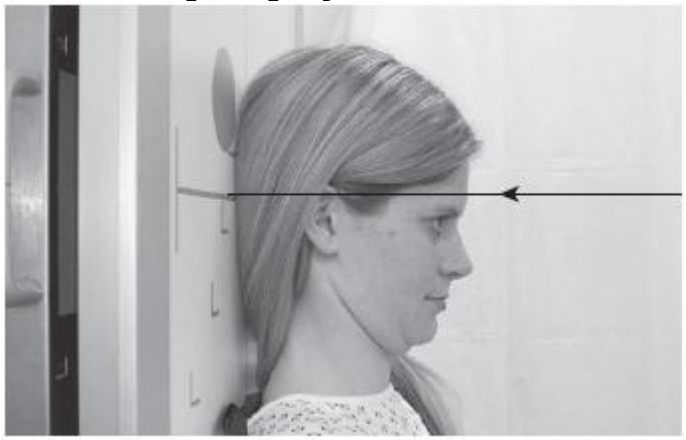


Fig. 8.4b Head position for FO projection.

The central ray enters the skull through the frontal bone and exits through the occipital bone. This is a fronto - occipital (FO)projection (Fig. 8.4b).

Beam angulation

Many OF or FO projections will require the central ray to pass along the sagittal plane at some angle to the orbital-meatal plane. In these cases the degree of angulation is stated after the name of the projection. The direction of angulation is also given. Cranial angulation involves the beam directed up the body towards the head (written in short form as ↑). If the central ray is angled toward the feet, the beam is then said to be angled caudally (written in short form as ↓). The photograph below shows a FO 30° caudal projection (FO30°↓) (Fig. 8.4c).

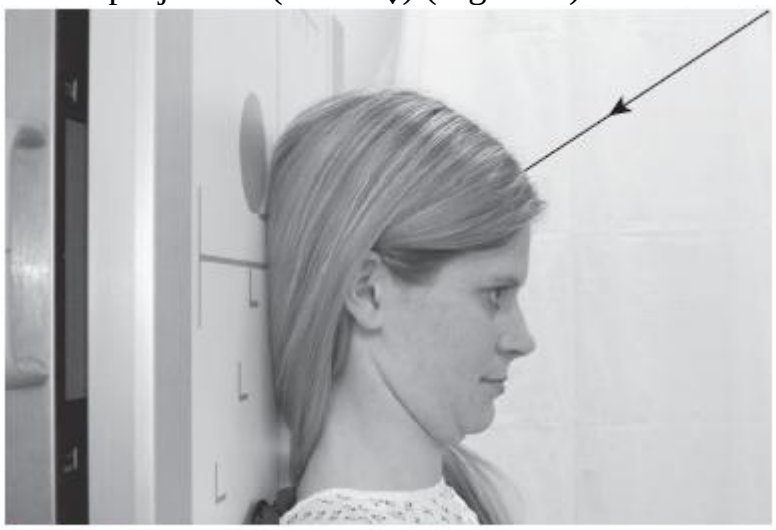


Fig. 8.4c Head position for FO30°↓ projection.

Lateral

For the lateral projection, the collimated central ray passes along a coronal plane at right-angles to the median sagittal plane. It is named according to the side of the head closest to the image receptor/cassette. In the example below the beam enters the skull on the left side, passes along a coronal plane and exits the head on the right side where the image receptor is located. This is therefore a right lateral (Fig. 8.4d).

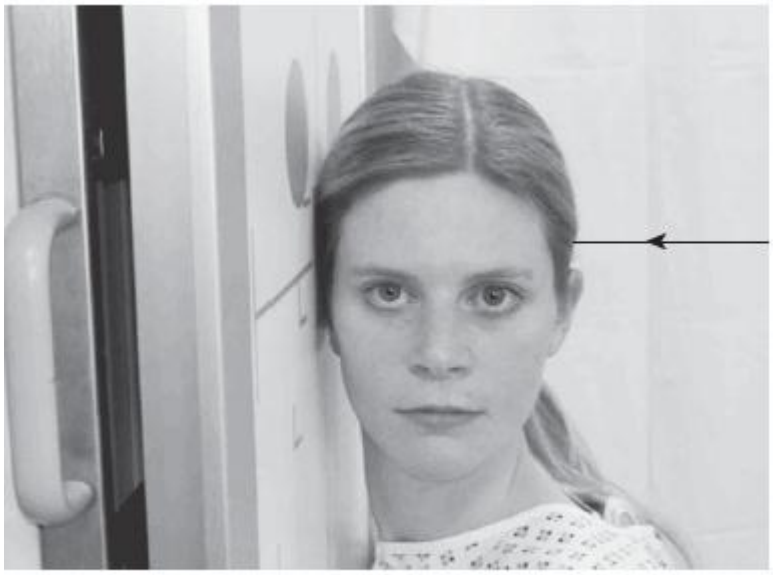


Fig. 8.4d Head position for lateral projection.

Oblique projections

An oblique projection is obtained when the central ray is at some angle to the median sagittal plane and the coronal plane. The naming of the projection will depend on two factors: firstly, whether the anterior or posterior portion of the head is in contact with the receptor/cassette; and secondly, whether the left or right side of the head is in contact with the receptor/cassette.

Forty degree left anterior oblique (40°LAO)

In this example the head is rotated to the left such that the median sagittal plane is 40° to the image receptor and the left side of the head is in contact with the image receptor (Fig. 8.5b).

Fig. 8.5b 40° LAO from a superior aspect.

Complex oblique projections

Oblique projections may become more complex when a caudal or cranial angulation is added in relation to a specified baseline. This additional angle is usually achieved by raising or lowering the chin such that the relevant baseline makes the required angle to

the image receptor. Alternatively the X-ray tube can be angled or a combination of both approaches may be useful if the patient has limited mobility.

Fifty five degree right anterior oblique with 35° caudal angulation (55° RAO35° ↓)

The head has been rotated such that the right side of the face is in contact with the receptor/cassette and the median sagittal plane makes an angle of 55° with the image receptor. In the example below the central ray has a 35° caudal angulation.
(Figs 8.5c, 8.5d).

Fig. 8.5c 55° right anterior oblique with 35° caudal angulation (lateral aspect).

Fig. 8.5d 55° right anterior oblique with 35° caudal angulation (superior aspect).

The photograph below shows how the same projection has been achieved with a combination of tube and orbital-meatal plane angulation. In this case the plane has been raised 20° and the tube has been given a 15° caudal angulation, in effect producing a total beam angulation of 35° to the orbital-meatal plane (Fig. 8.5e).

Fig. 8.5e 55° right anterior oblique with 35° caudal angulation (lateral aspect). RBL raised 20° with 15° caudal angle on the tube.