Al-Mustaqbal University

College of Health and Medical Technique

Radiology Techniques Department

Third class

By

Assist. lecture
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lecture : 4

Facial bones and sinuses

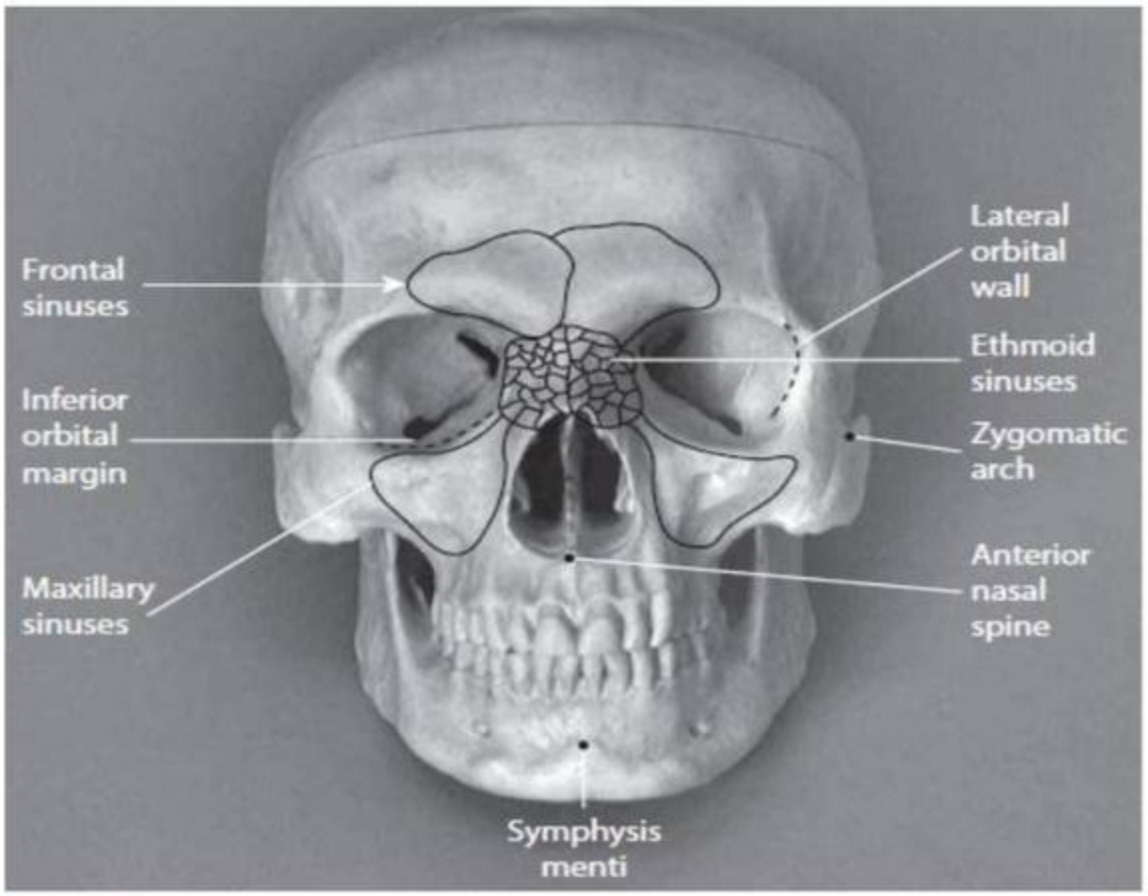

Fig. 8.25a Anterior aspect of the skull showing important structures.

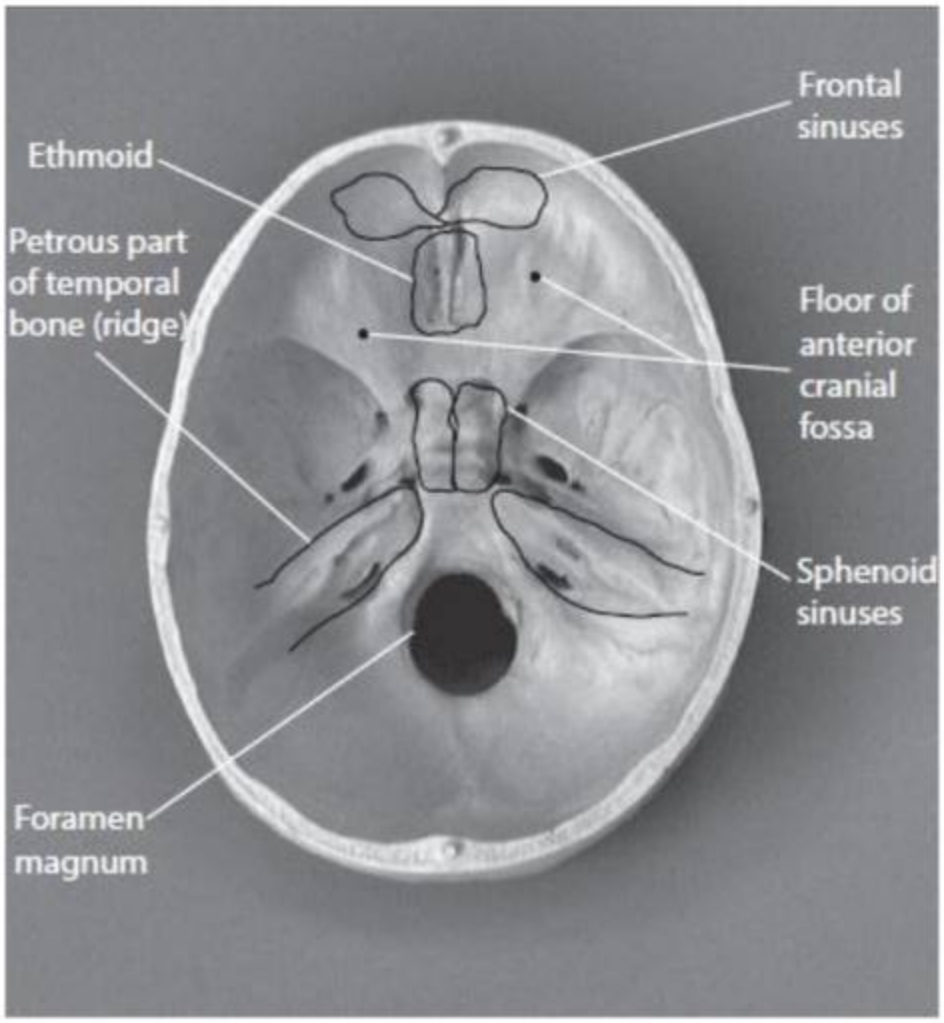

Fig. 8.25b Axial section of the skull showing the important structures.

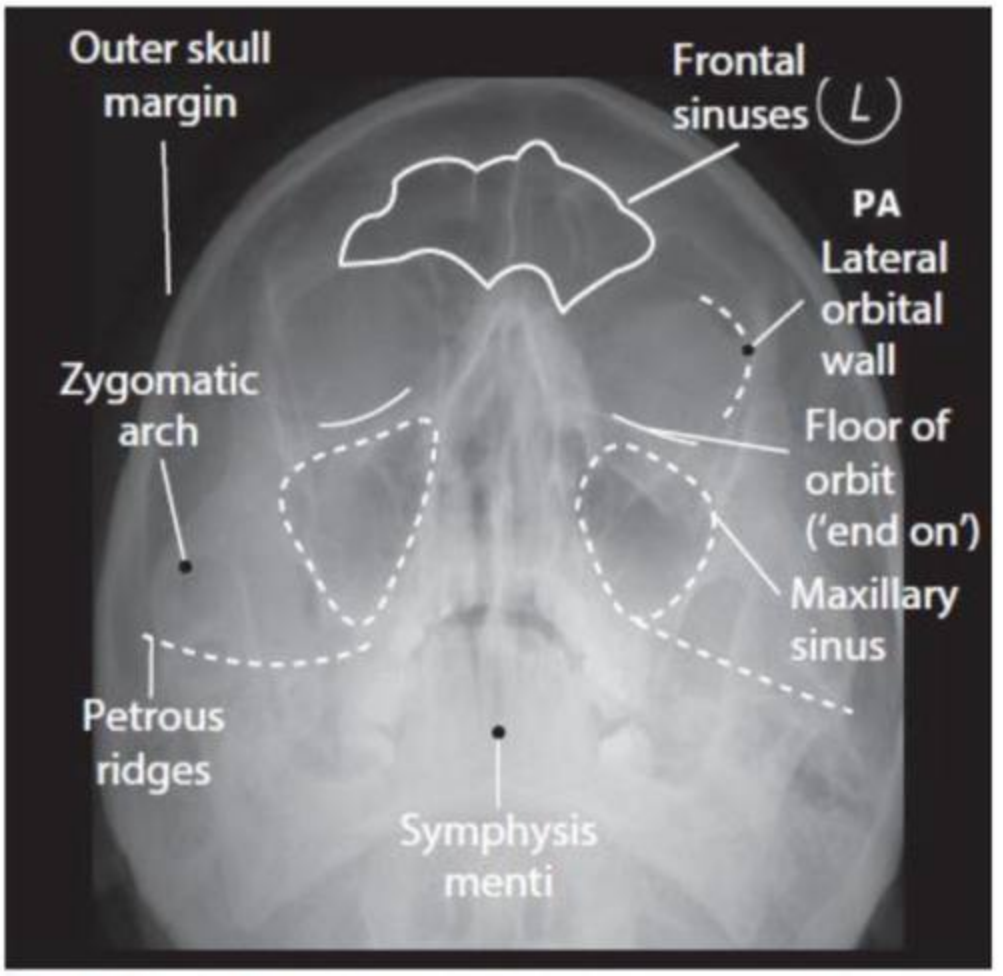

Fig. 8.26a Labelled radiograph showing important structures.

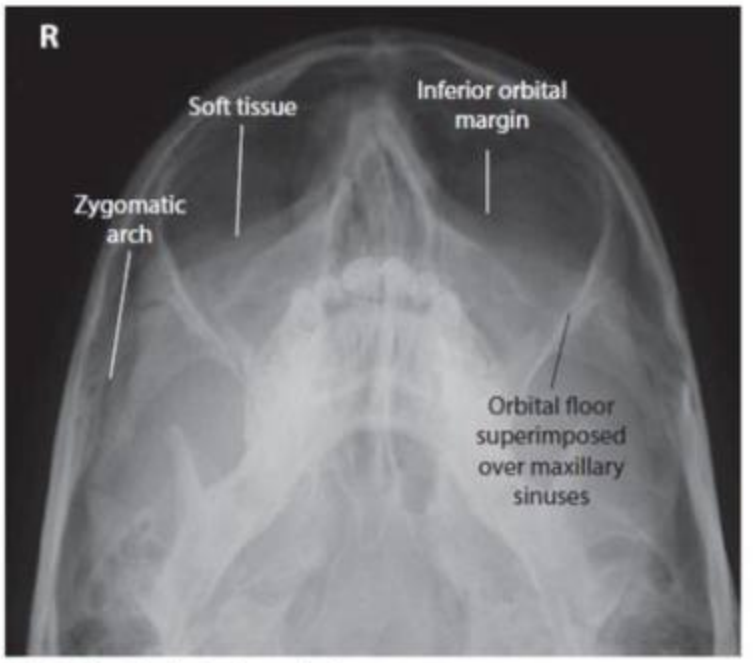

Fig. 8.26b Labelled radiograph showing important structures.

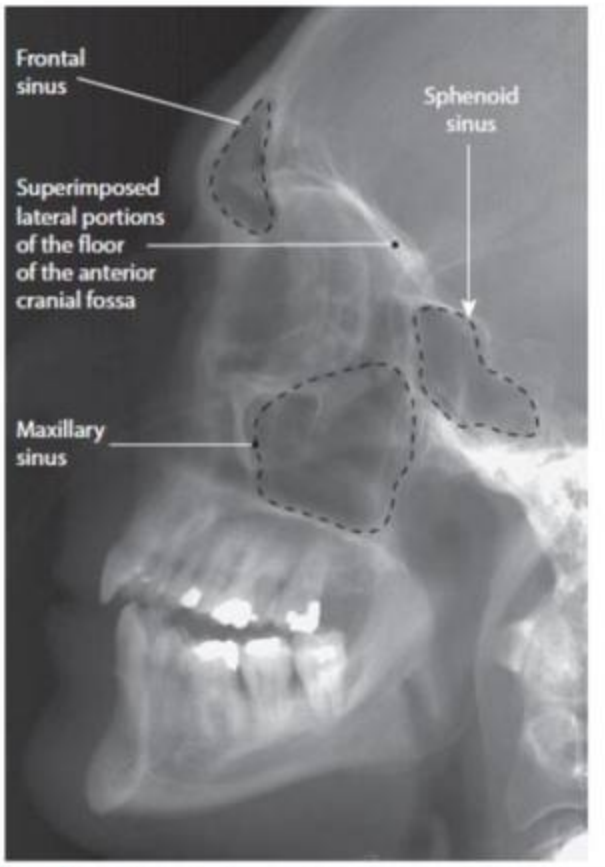

Fig. 8.26c Labelled radiograph showing important structures.

Facial bones

Occipito-mental (Fig. 8.28a)

The occipito-mental (OM) projection shows the floor of the orbits, nasal region, the maxillae, inferior parts of the frontal bone and the zygomatic bone. The OM projection is designed to project the petrous parts of the temporal bone (which overlies the region and would cause unwanted 'noise' on a facial bone image) below the inferior part of the maxilla.

Position of patient and image receptor

- The projection is best performed with the patient erect, seated facing the Bucky/receptor.
- The patient's nose and chin are placed in contact with the midline of the Bucky/receptor and then the head is adjusted to bring the orbito-meatal baseline to a 45° angle to the Bucky/receptor.
- The horizontal central line of the Bucky/receptor should be at the level of the lower orbital margins.
- Ensure the median sagittal plane is at right-angles to the Bucky/receptor by checking the outer canthus of the eyes and the EAMs are equidistant.

Direction and location of the X-ray beam

- The collimated horizontal beam is centred to the Bucky/ receptor before positioning is undertaken.
- To check the beam is centered properly, the crosslines on the Bucky/receptor should coincide with the patient's anterior nasal spine.

Fig. 8.28a Patient positioning.

Essential image characteristics

- The petrous ridges should be demonstrated inferior to the floors of the maxillary sinuses.
- There should be no rotation. This can be checked by ensuring the distance from the lateral orbital wall to the outerskull margins is equidistant on both sides.

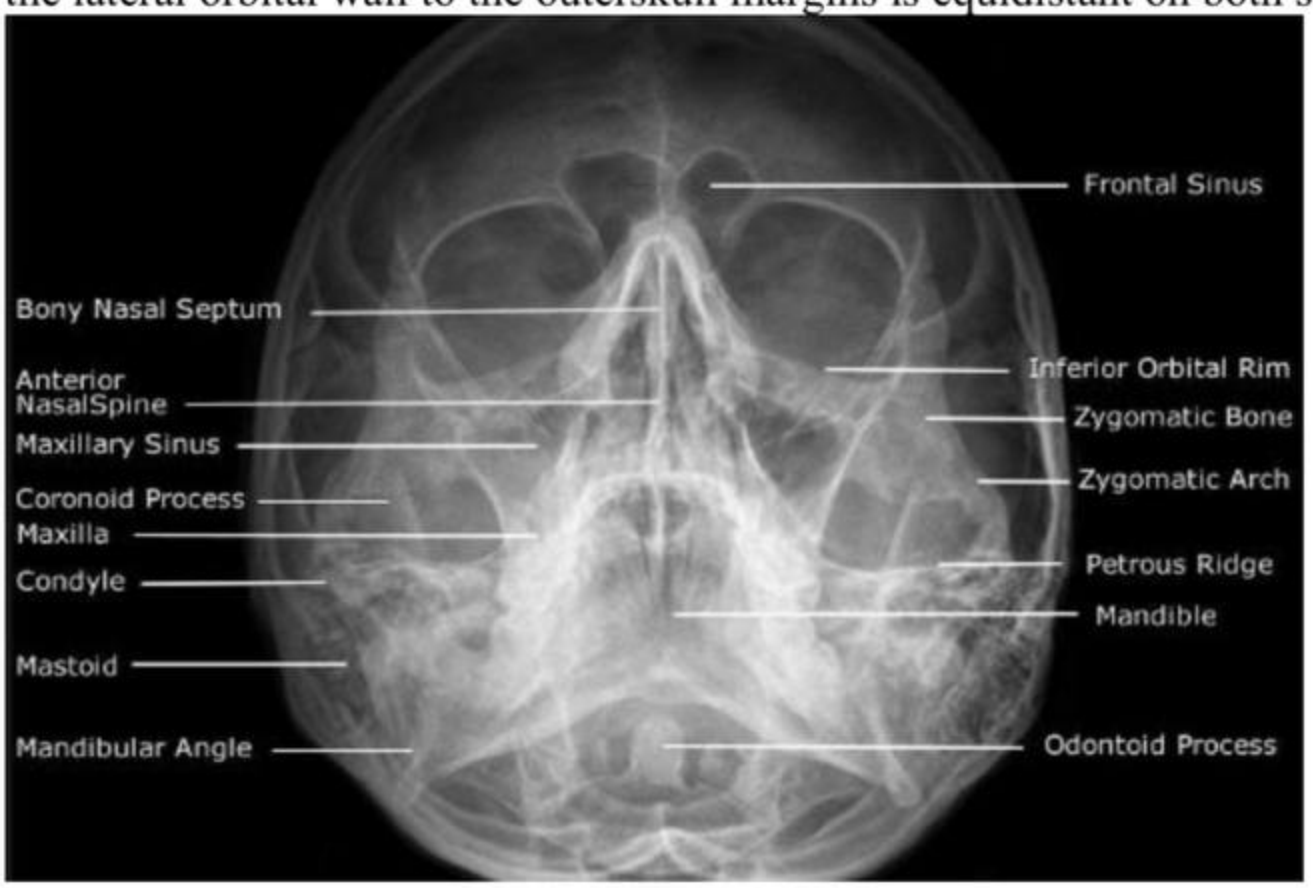

Fig.a.28b OM radiograph

Modified mento-occipital (Figs 8.29a–8.29c)

Patients who have sustained trauma will often present supine on a trolley, Modifications in technique will therefore be required by imaging the patient in the antero-posterior position and adjusting the beam angle to ensure the petrous bones are projected away from the facial bones.

Position of patient and image receptor

- The patient will be supine on the trolley and should not be moved. The CR cassette/receptor is placed either in the cassette tray in the trolley or under the patient.
- The top of the CR cassette/receptor should be at least 5 cm above the top of the head to allow for any cranial beam angulation.

Direction and location of the X-ray beam

- The patient should be assessed for position (angle) of the orbito-meatal line in relation to the receptor and obviously any modifications must be made to the tube angulation and the patient not moved.

• If the baseline makes an angle of 45° back from vertical (chin raised), then a perpendicular beam can be employed centred to the midline at the level of the lower orbital margins.
• If the orbito-meatal baseline makes an angle of less than 45° with the cassette/receptor then the difference between the measured angle and 45° should be added to the beam in the form of a cranial angulation. The centring point remains the same.
• For example, if the orbito-meatal baseline was estimated to be 20° from vertical as the chin was raised, then a 25° cranial angulation would need to be applied to the tube to maintain the required angle (see image).
• The beam is collimated to the area of interest.

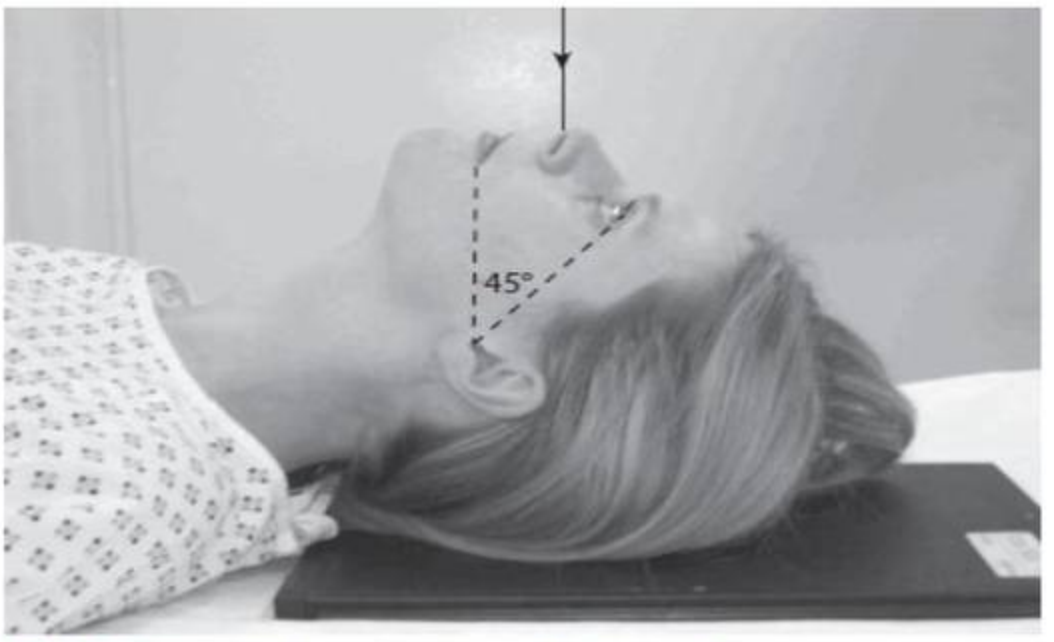

Fig. 8.29a Patient imaged supine with 45° baseline.

Fig. 8.29b Patient imaged supine with 20° baseline and 25° cranial angulation.

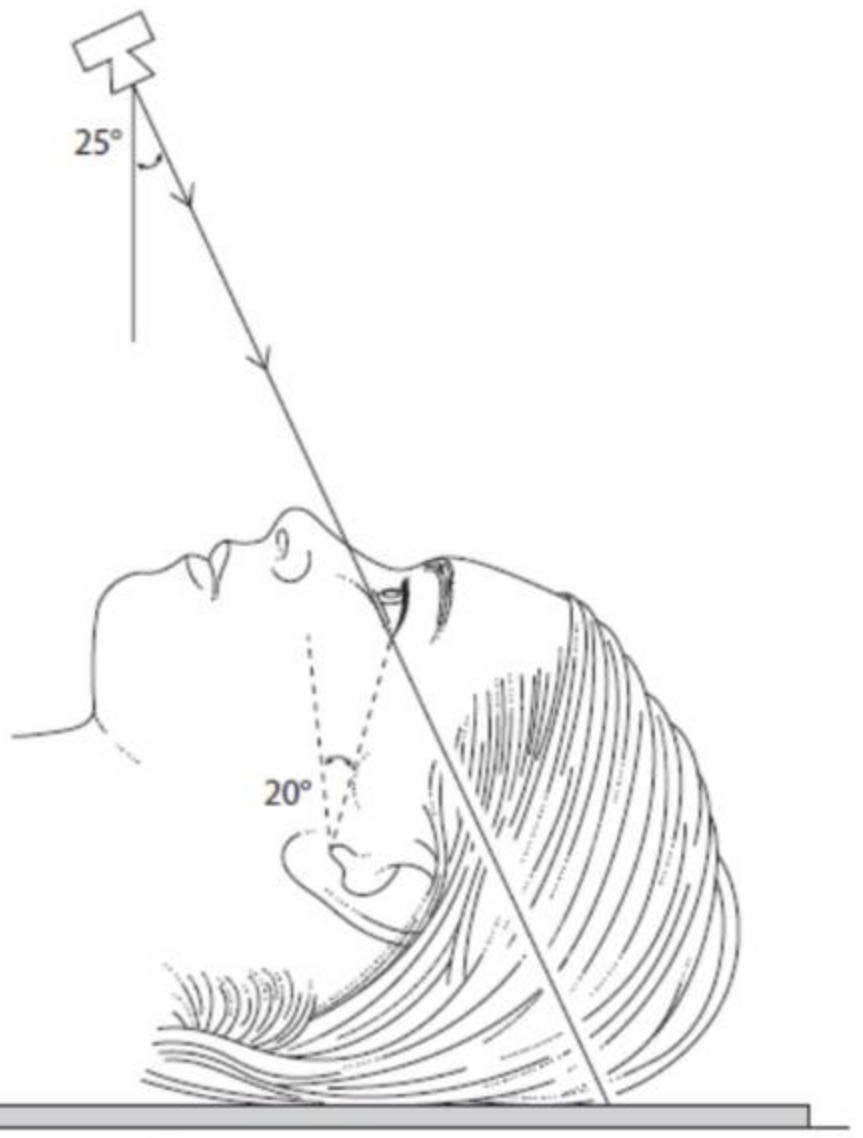

Fig. 8.29c Diagram of head from side showing 20° raised RBL to vertical and 25° cranial angulation.

Occipito-mental 30° caudal (Figs 8.30a–8.30c)

This projection demonstrates the lower orbital margins and the orbital floors. The zygomatic arches are more visible compared with the OM but are still somewhat foreshortened.

Position of patient and image receptor

- The projection is best performed with the patient seated facing the vertical Bucky/receptor.
- The patient's nose and chin are placed in contact with the midline of the Bucky/receptor and then the head is adjusted to bring the orbito-meatal base line to a 45° angle to the Bucky/receptor.
- The horizontal central line of the Bucky/receptor should be at the level of the symphysis menti.
- Ensure the median sagittal plane is at right-angles to the Bucky/receptor by checking that the outer canthus of the eyes and the EAMs are equidistant.

Direction and location of the X-ray beam

- The tube is angled 30° caudally from the horizontal and centred along the midline such that the central ray exits at the level of the lower orbital margins.
- To ensure the collimated beam is centered properly, the crosslines on the Bucky/cassette holder should coincide approximately with the upper aspect of the symphysis menti region.

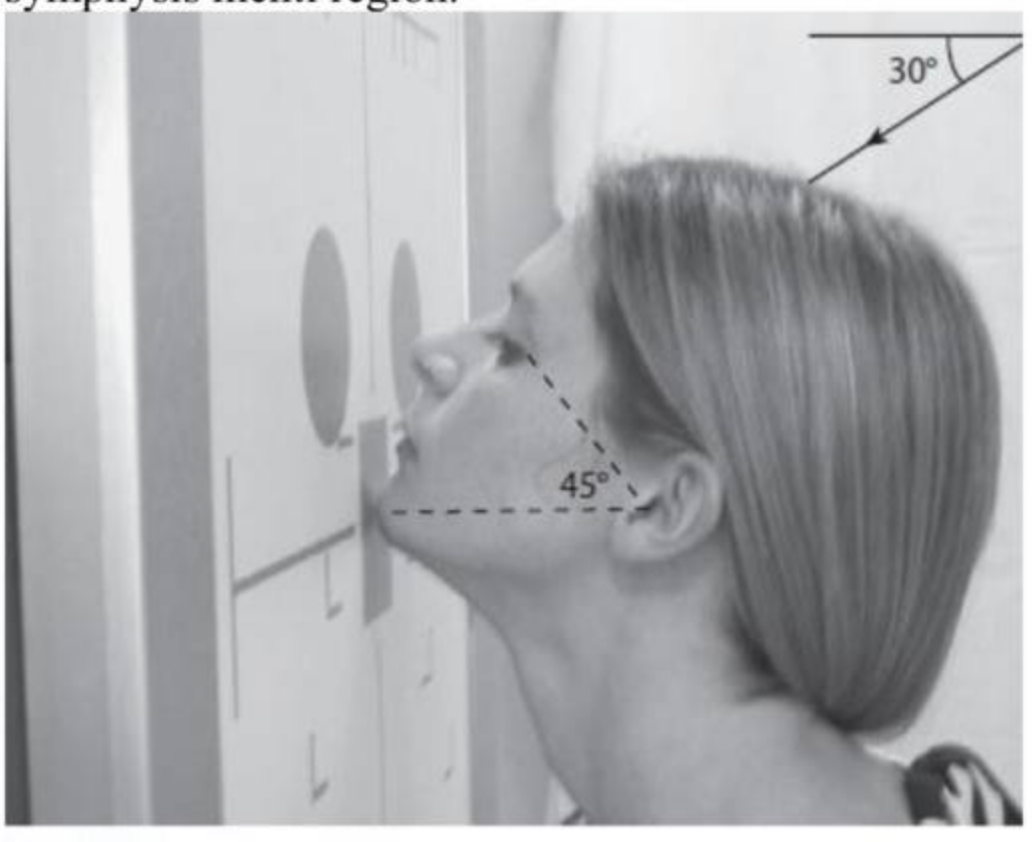

Fig. 8.30a Patient positioning.

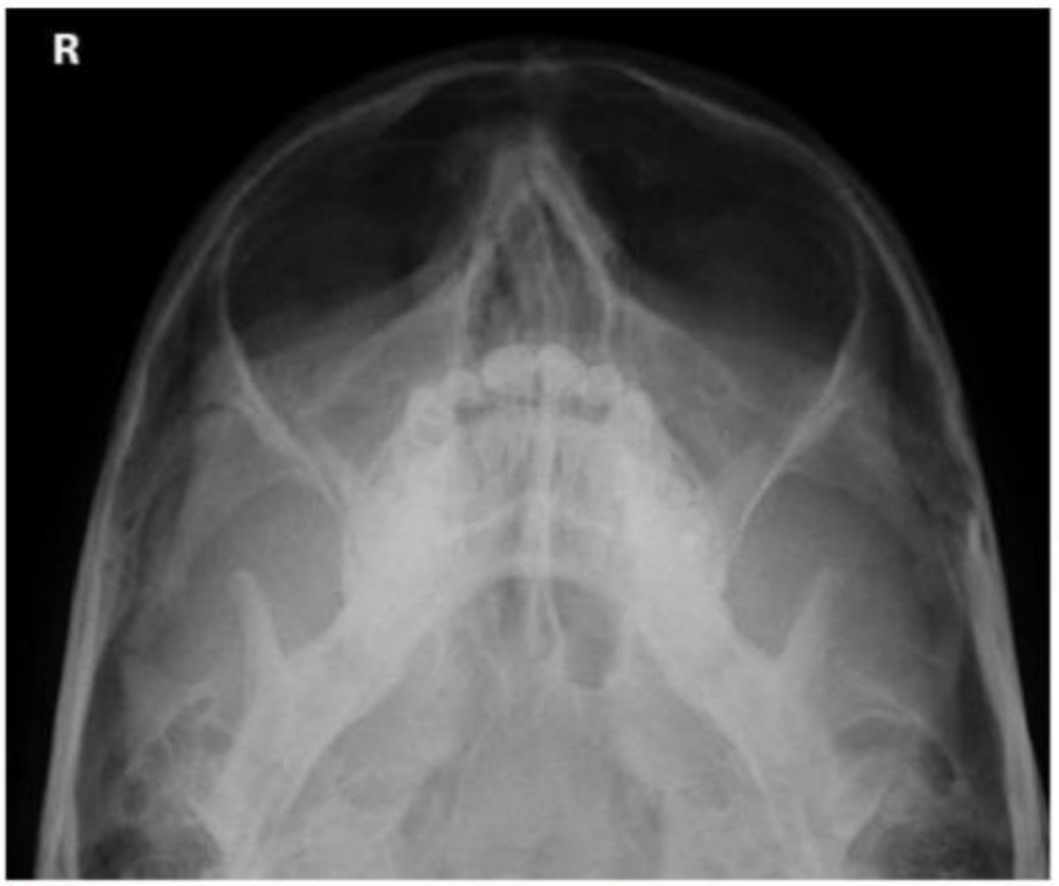

Fig. 8.30b Occipito-mental 30° caudal radiograph.

Essential image characteristics

- The orbital floors will be clearly visible through the maxillary sinuses and the lower orbital margin should be clearly demonstrated.
- There should be no rotation. This can be checked by ensuring the distance from the lateral orbital wall to the outer skull margins is equidistant on both sides.

Lateral (Figs 8.32a, 8.32b)

In cases of injury this projection should be specifically requested and taken using a horizontal beam. The patient may be positioned erect or supine.

Position of patient and image receptor

Erect

- The patient sits facing the vertical Bucky/receptor. The head is rotated such that the side under examination is in contact with the Bucky/receptor.
- The arm on the same side is extended comfortably by the trunk whilst the other arm may be used to grip the Bucky/ receptor for stability. The Bucky/receptor height is altered such that its centre is 2.5 cm inferior to the outer canthus of the eye.

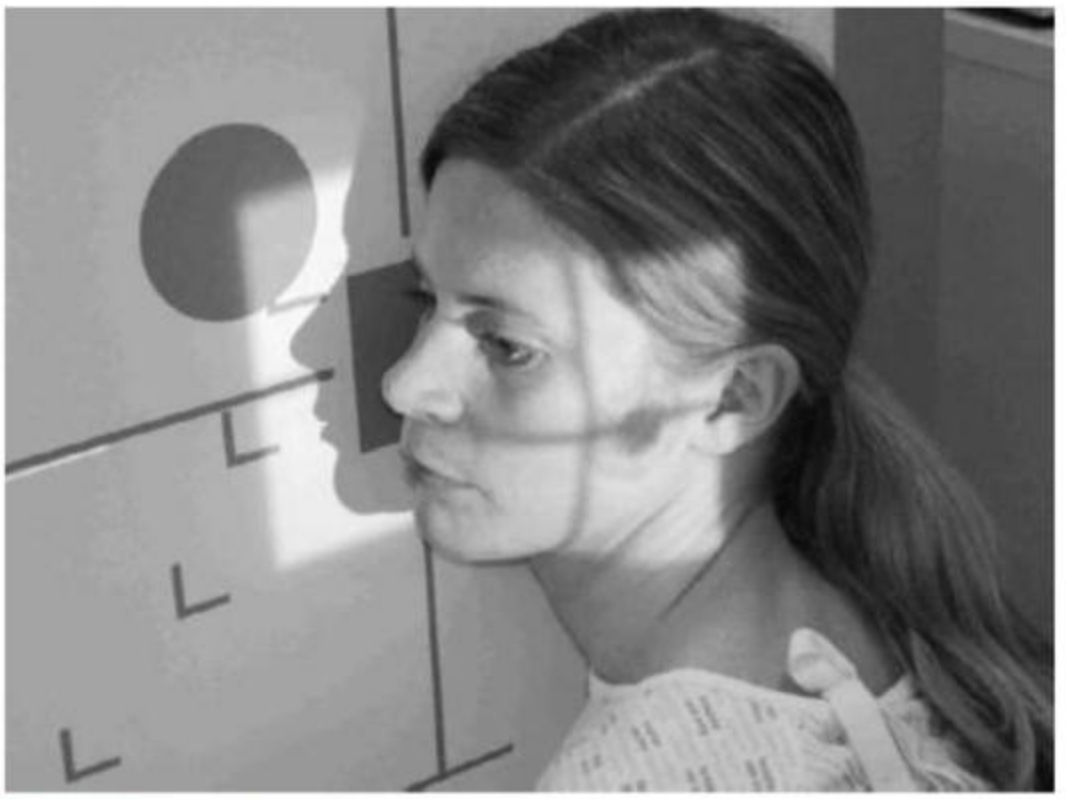

Fig. 8.32a Patient positioning, erect.

Supine

• The patient lies on the trolley with their arms extended by the sides and the median sagittal plane vertical to the trolley top.

• CR cassette is supported vertically against the side under examination so that the centre of the receptor is 2.5 cm inferior to the outer canthus of the eye.In either case the median sagittal plane is brought parallel to the Bucky/receptor by ensuring that the interorbital line is at right-angles to the Bucky/receptor.

Direction and location of the X-ray beam

• The collimated horizontal beam is centred to a point 2.5 cm inferior to the outer canthus of the eye.

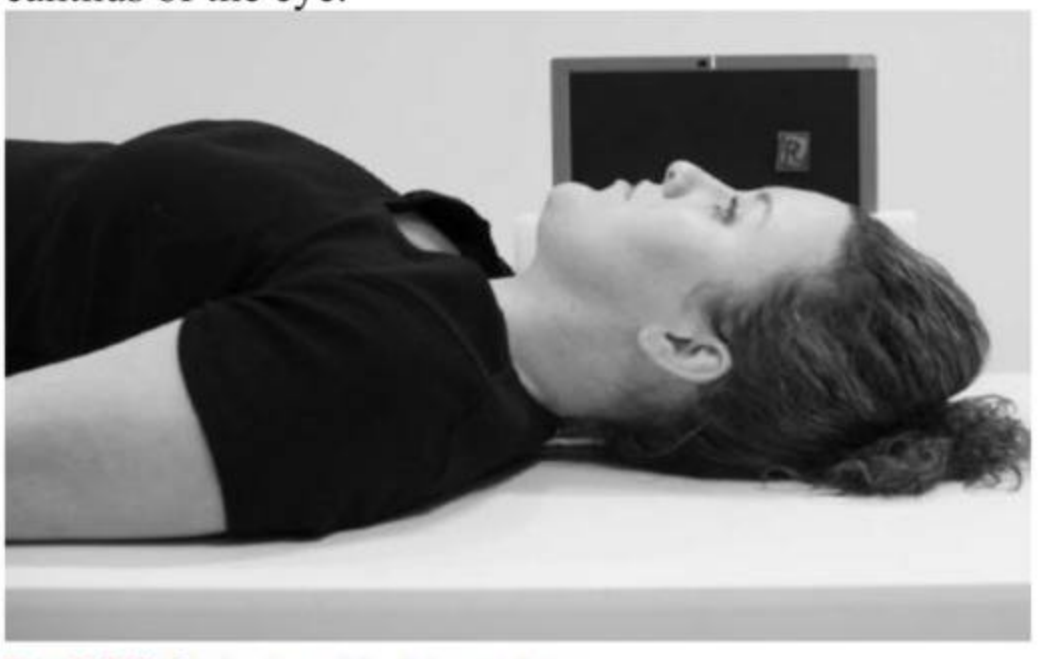

Fig. 8.32b Patient positioning, supine.

Essential image characteristics (Fig. 8.32c)

• The image should contain all of the facial bones sinuses, including the frontal sinus.
• A true lateral will have been obtained if the lateral portions of the floor of the anterior cranial fossa are superimposed.

Fig. 8.32c.Lateral radiograph

Zygomatic arches – infero superior (Figs 8.33a, 8.33b)

It is often referred to as the 'jug handle' projection as the whole length of the zygomatic arch is demonstrated in profile against the side of the skull and facial bones.

Position of patient and image receptor

• The patient lies supine with one or two pillows under the shoulders to allow the neck to be fully extended.
• An 18 × 24 cm CR cassette is placed against the vertex of the skull such that its long axis is parallel with the axial plane of the body. It should be supported in this position with foam pads and sandbags.
• The flexion of the neck is now adjusted to bring the long axis of the zygomatic arch parallel to the CR cassette.

• The head in now tilted 5–10° away from the side under examination. This allows the zygomatic arch under examination to be projected on to the image without superimposition of the skull vault or facial bones.

Direction and location of the X-ray beam

• The central ray should be perpendicular to the CR cassette and long axis of the zygomatic arch.

• A centring point should be located such that the central ray passes through the space between the midpoint of the zygomatic arch and the lateral border of the facial bones.

• Close collimation should be applied to reduce scatter and to avoid irradiating the eyes.

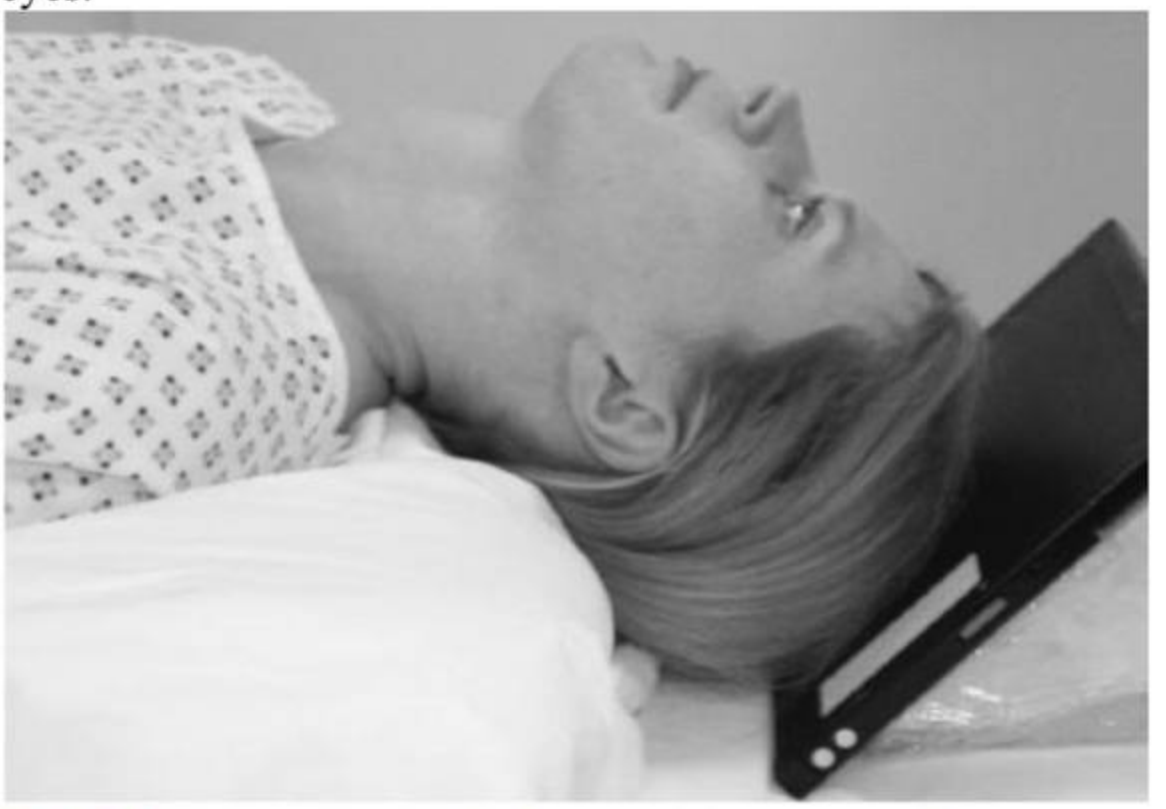

Fig. 8.33a Supine positioning for infero-superior zygomatic arch.

Essential image characteristics (Fig. 8.33c)

• The whole length of the zygomatic arch should be demonstrated clear of the cranium.

• If this has not been achieved it may be necessary to repeat the examination and alter the degree of head tilt to try and bring the zygomatic arch clear of the skull.

Fig. 8.33c Zygomatic arch demonstrating double fracture.

Orbits – occipito-mental (modified) (Fig. 8.34a)

This is a frequently undertaken projection used to assess injuries to the orbital region (e.g. fracture of the orbital floor) and to exclude the presence of metallic foreign bodies in the eyes prior to MRI investigations.

Position of patient and image receptor

- The projection is best performed with the patient seated facing vertical Bucky.
- The patient's nose and chin are placed in contact with the midline of the cassette holder and then the head is adjusted to bring the orbito-meatal baseline to a 35° angle to the image receptor.
- The horizontal central line of the vertical Bucky/receptor should be at the level of the midpoint of the orbits.
- Ensure the median sagittal plane is at right-angles to the Bucky/receptor by checking the outer canthi of the eyes and the EAMs are equidistant from the image receptor.

Direction and location of the X-ray beam

- The central ray will be perpendicular to the cassette holder .
- To check the beam is centered properly the crosslines on the Bucky/receptor should coincide with the midline at the level of the mid-orbital region.

Fig. 8.34a Patient positioning.

Fig. 8.34c Radiograph of orbits.

Nasal bones – lateral (Figs 8.35a, 8.35b)

Position of patient and image receptor

- The patient sits facing an 18 × 24 cm CR cassette supported in the cassette stand of a vertical Bucky.
- The head turned so the median sagittal plane is parallel with the image receptor and the interpupillary line is perpendicular to the image receptor.
- The nose should be roughly coincident with the centre of the image receptor.

Direction and location of the X-ray beam

• A horizontal central ray is directed through the centre of the nasal bones and collimated to include the nose.

Fig. 8.35a Patient positioning.

Fig. 8.35b Lateral radiograph of the nose.