Al-Mustaqbal University

Radiological Techniques Department

Radiographic technique

# Cervical spine ,AP , lateral , AP for C1-C3 , AP view for C3- C7, shown structure

## Lecture 5

## Third stage

By

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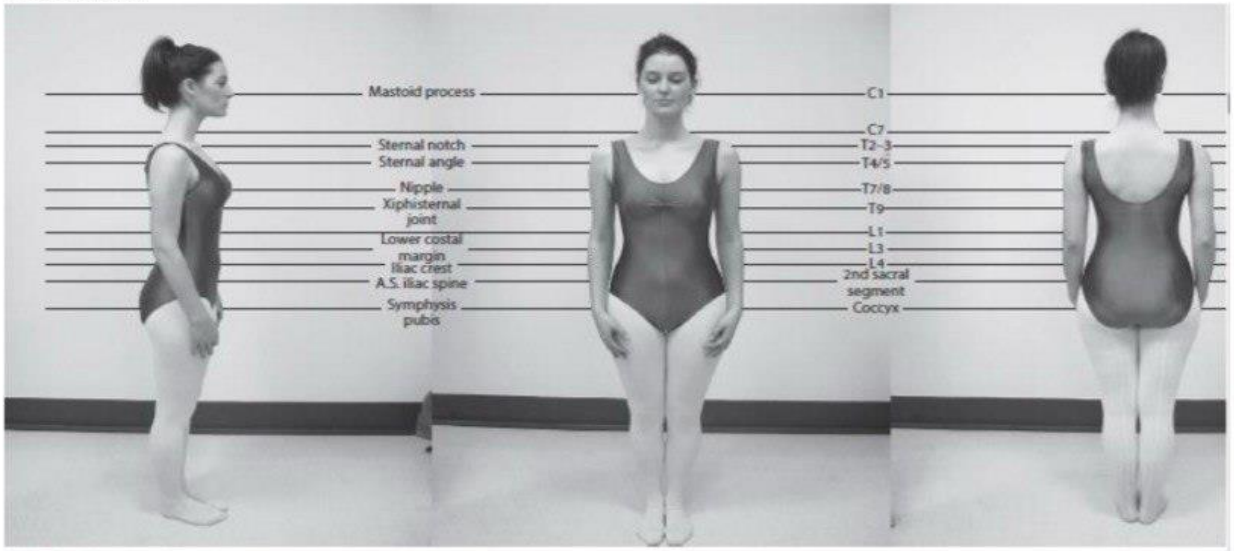
# Vertebral levels

The photographs below and Fig. 6.3 illustrate the surface markings of the vertebral levels, which are useful in radiographic positioning. The relative positions may vary according to the patient's build and posture.

## Useful landmarks (Fig. 6.2)

The easily palpated tip of the mastoid process indicates the level of C1.

- The spinous process of C7 produces a visible protuberance on the posterior aspect of the inferior part of the neck. Below this, the spinous process of the thoracic spine can be palpated.
- The inferior angle of the scapula indicates the level of T7 when the arms are placed by the side.
- The sternal notch lies at the junction between T2 and T3.
- T4 is indicated by the sternal angle with T9 corresponding to the xiphisternal joint, although the size of this structure is variable.
- The lower costal margin indicates L3 and is located easily. This is a very useful aid to positioning in spinal radiography.
- A line joining the most superior parts of the iliac crests indicates the level of L4, whilst the tubercle of the iliac crest discloses the location of L5.
- The anterior and posterior iliac spines lie at the level of the second sacral vertebra.




6.2 Useful surface landmarks.

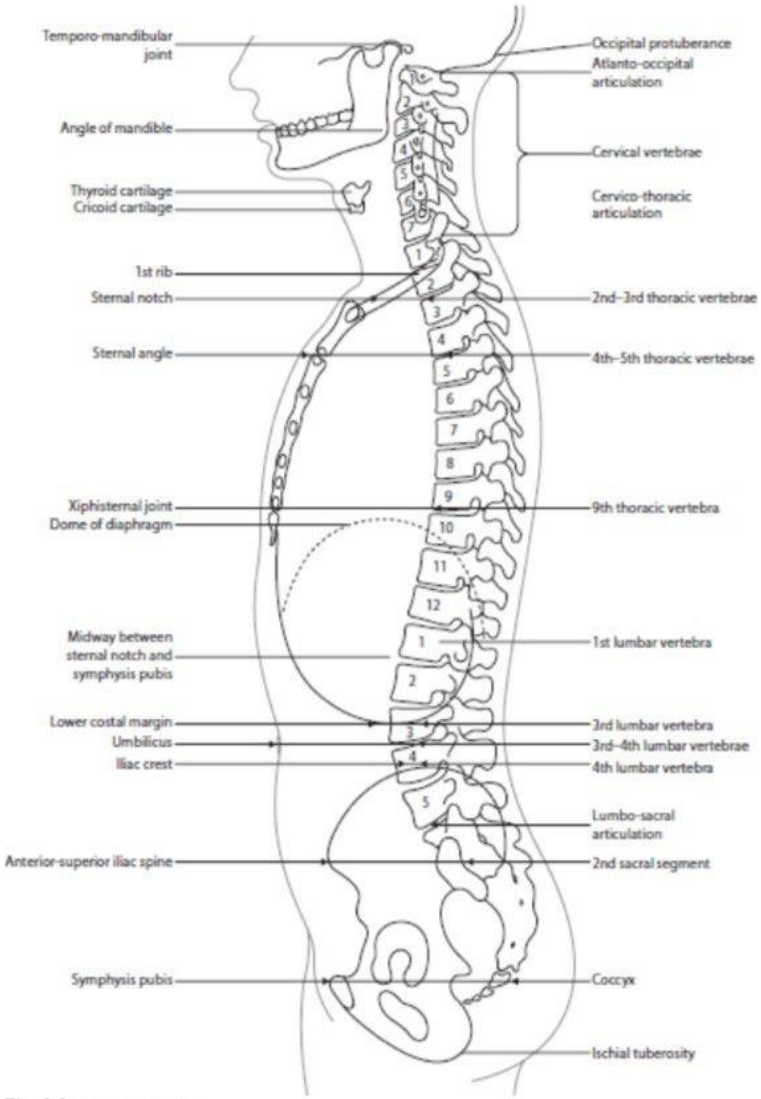



Fig. 6.3 Vertebral levels

# Cervical vertebrae

## Basic projections

Many centres perform an antero-posterior (AP) and a lateral projection, with the addition of a further AP image to demonstrate the C1/2 region if the patient has a history of trauma. CR, 18 × 24 cm image receptor size cassettes are employed routinely, but 24 × 30 cm cassettes are often used in difficult cases.

## Lateral erect (Basic) (Figs 6.4a–6.4c)

### Position of patient and image receptor

- The patient stands or sits with either shoulder against the CR cassette or vertical Bucky.
- The median sagittal plane should be adjusted such that it is parallel with the image receptor.

• The head should be adjusted such that the angle of the mandible is not superimposed over the upper anterior cervical vertebra or the occipital bone does not obscure the posterior arch of the atlas.
• To aid immobilisation, the patient should stand with the feet slightly apart and with the shoulder resting against the cassette stand.
• In order to demonstrate the lower cervical vertebra, the shoulders should be depressed, as shown in the photograph. This can be achieved by asking the patient to relax their shoulders downwards. The process can be aided by asking the patient to hold a weight in each hand (if they are capable).

### Direction and location of the X-ray beam

• The collimated horizontal beam is centred over a point vertically below the mastoid process at the level of the prominence of the thyroid cartilage.

Fig. 6.4a Positioning of erect patient for cervical lateral projection

### Essential image characteristics

• The whole of the cervical spine should be included, from the atlanto-occipital joints to the top of the first thoracic vertebra.
• The mandible or occipital bone does not obscure any part of the upper vertebra.
• Soft tissues of the neck should be included.
• The contrast should produce densities sufficient to demonstrate soft tissue and bony detail.

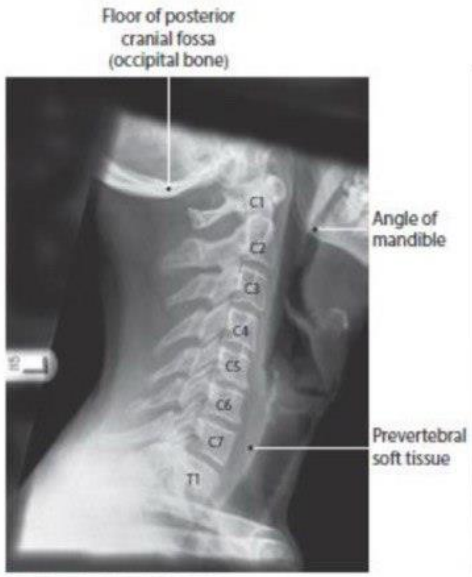


Fig. 6.5b Annotated cervical spine.


Fig. 6.5a Lateral image of cervical spine showing good technique.

### Common faults and solutions

• Failure to demonstrate C7/T1: if the patient cannot depress the shoulders, even when holding weights, then a swimmers' projection should be considered.

## Lateral supine (Figs 6.6a, 6.6b)

For trauma cases, the patient's condition usually requires the examination to be performed on a trolley. The lateral cervical spine projection is taken first, without moving the patient. The resulting radiographic image must be examined by a medical officer to establish whether the patient's neck can be moved for other projections.

### Position of patient and image receptor

• The patient will normally arrive in the supine position.

• It is vitally important for the patient to depress the shoulders.

• A CR cassette can be either supported vertically or placed in the erect cassette holder.


Fig. 6.6a Patient positioning on trolley using a vertical detector system.

Fig. 6.6c Lateral supine projection showing fracture dislocation of C5/C6.

## Antero-posterior – first and second cervical vertebrae (open mouth)
## (Fig. 6.7a)

### Position of patient and image receptor

• The patient lies supine on the Bucky table or, if erect positioning is preferred, sits or stands with the posterior aspect of the head and shoulders against the vertical Bucky detector system.

• The medial sagittal plane is adjusted to coincide with the midline of the image receptor, such that it is at right-angles to the image receptor.

• The neck is extended, if possible, such that a line joining the tip of the mastoid process and the inferior border of the upper incisors is at right-angles to the cassette. This will superimpose the upper incisors and the occipital bone, thus allowing clear visualisation of the area of interest.

• The receptor is centred at the level of the mastoid process.

### Direction and location of the X-ray beam

• The collimated beam is directed with the perpendicular central ray along the midline to the centre of the open mouth.

Fig. 6.7a Patient positioning for AP cervical projection.

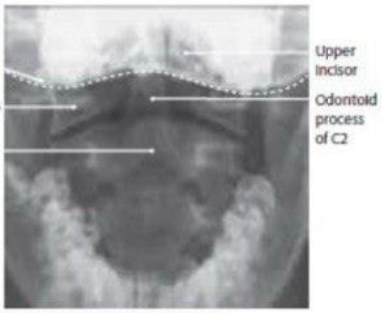



Fig. 6.7c Annotated AP cervical spine radiograph.

### Common faults and solutions

• Failure to open the mouth wide enough: the patient can be reminded to open their mouth as wide as possible just before the exposure.

• Check for rotation during positioning.

• If the front teeth are superimposed over the area of interest, then the image should be repeated with the chin raised (Fig. 6.8a).

Fig. 6.8a Incorrect positioning – upper teeth superimposed.

## Antero-posterior – third to seventh cervical vertebrae (Basic) (Figs 6.9a–6.9c)

### Position of patient and image receptor

• The patient lies supine on the Bucky table or, if erect positioning is preferred, sits or stands with the posterior aspect of the head and shoulders against the vertical Bucky detector system

• The median sagittal plane is adjusted to be at right-angles to the image receptor and to coincide with the midline of the table or Bucky.

• The neck is extended (if the patient's condition will allow) so that the lower part of the jaw is cleared from the upper cervical vertebra.

### Direction and location of the X-ray beam

• The collimated beam is directed with a 5–15° cranial angulation, such that the inferior border of the symphysis menti is superimposed over the occipital bone.

• The beam is centred in the midline towards a point just below the prominence of the thyroid cartilage through the fifth cervical vertebra.

# THANK YOU