

CHAPTER 1

An Introduction to Radiographic Positioning and Terminology

This chapter will describe radiographic terminology in the following sections.

- Anatomical Terminology
- Positioning Terminology
- Projection Terminology
- Glossary of Terms

Anatomical Terminology

Diagnostic radiography uses a system of rules to describe the body and its movements. It is important to develop a good understanding of the terminology to be able to describe and understand the range of radiographic techniques outlined throughout this book. This terminology provides a clear and consistent approach to describing the location of anatomical structures and is used by a range of healthcare professionals. The use of this shared language enables clinicians and radiographers to communicate effectively in order to obtain the necessary diagnostic images.

The basic terminology descriptions refer to the standard reference position/orientation of the human body. This is known as the anatomical position.



The standard anatomical position seen in Figure 1.1 can be described as a person in the following orientation.

- Standing upright and facing forward.
- Arms straight, hands at the level of the hips with palms facing forwards.
- Feet together with toes pointing forwards.

FIGURE 1.1 The anatomical position.

Using the anatomical position as the standard reference, the patient aspect can be described in the following terms.

Anterior aspect: this is seen when viewing the patient from the front.

Posterior aspect: this is seen when viewing the patient from the back.

Lateral aspect: this refers to any view of the patient (or any anatomical part) from the side e.g. the outer side of a limb.

Medial aspect: this refers to any view of the patient (or any anatomical part) which is closest to the midline, e.g. the inner side of a limb.



FIGURE 1.2 Anterior aspect.



FIGURE 1.3 Posterior aspect.



FIGURE 1.4 Lateral aspect.

Positioning Terminology

Planes of the Body

There are three planes of the body which are regularly used to describe the position of a patient in both projection and cross-sectional imaging.

Median sagittal plane: divides the body into equal left and right parts. Any plane parallel to this which divides the body into unequal right and left parts is known as a sagittal plane.

Coronal plane: divides the body into anterior and posterior parts.

Transverse/axial plane: divides the body into superior and inferior parts.

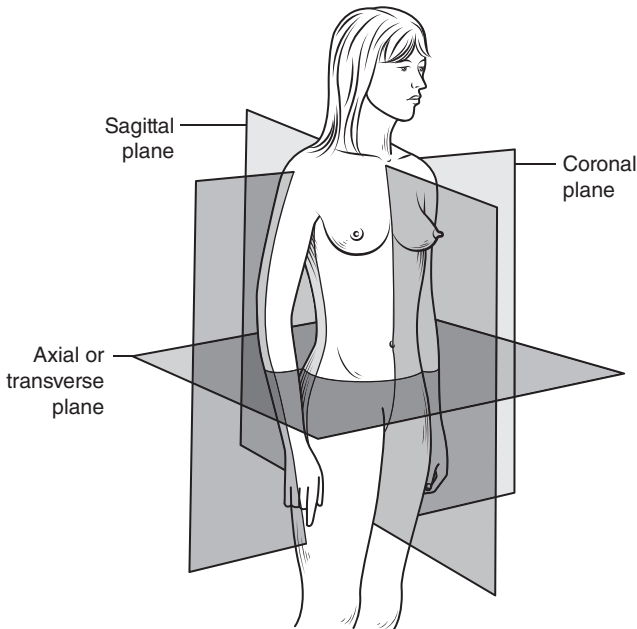


FIGURE 1.5 Anatomical body planes.

Skull Positioning Lines and Planes

Skull, facial bone and dental radiography is undertaken with reference to recognised imaginary lines and planes of the skull. These assist radiographers (and others) when describing an area of interest or in positioning.

Lines of the Skull

- *Interpupillary (interorbital) line*: this is an imaginary line which joins the centre of the two pupils when the eyes are looking straight ahead.
- *Radiographic baseline (also known as the orbitomeatal line)*: this extends from the outer canthus of the eye on a slight diagonal line to the centre of the external auditory meatus (EAM).
- *Infraorbital line*: joins the two infraorbital points.
- *Anthropological baseline (also known as the Frankfurt line)*: passes from the infraorbital point to the upper border of the EAM.

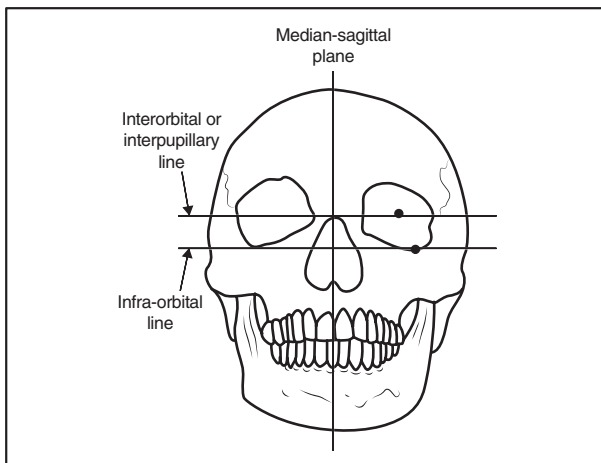
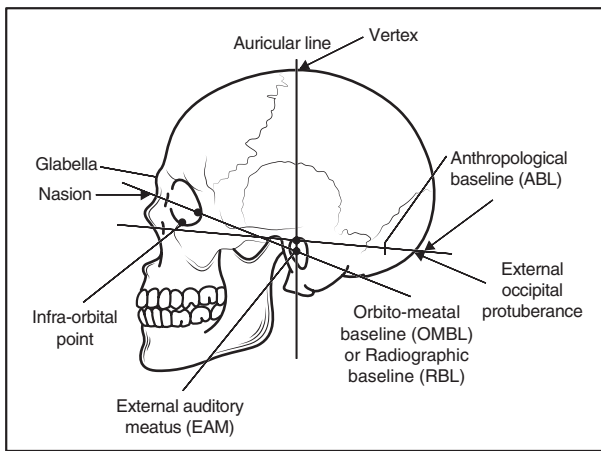


FIGURE 1.6 Anatomical positioning lines of the skull and face.

Planes of the Skull

- *Median sagittal plane*: divides the skull into equal left and right parts. Any plane parallel to this which divides the body into unequal right and left parts is known as a sagittal plane.
- *Coronal planes*: these run at right angles to the median sagittal plane and divide the head into anterior and posterior parts.
- *Transverse/axial plane*: divides the head into superior and inferior parts.
- *Auricular plane*: is perpendicular to the transverse/axial plane. It passes through the centre of the external auditory meatuses.

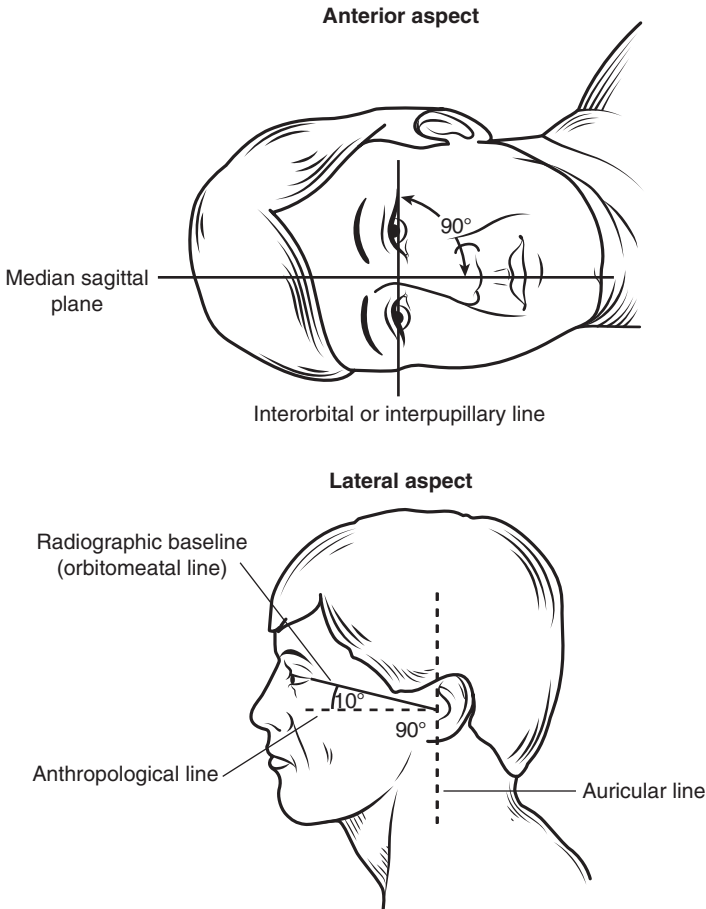


FIGURE 1.7 Planes of the skull.

Patient Positioning Terminology

The following terms are used to describe how the patient is positioned for a range of radiographic examinations/projections.

- *Erect*: the projection is taken with the patient either standing or sitting upright.
- *Decubitus*: the projection is taken with the patient lying down in any of the following positions.
 - *Supine*: the patient is lying on their back, face up.
 - *Prone*: the patient is lying on their front, and is face down.
 - *Lateral decubitus*: the patient is lying on their side. A right lateral decubitus is when the patient is lying on the right side; if the patient is facing the opposite side, this would be a left lateral decubitus.
 - *Semi-recumbent*: the patient is reclining, lying halfway between supine and sitting erect.

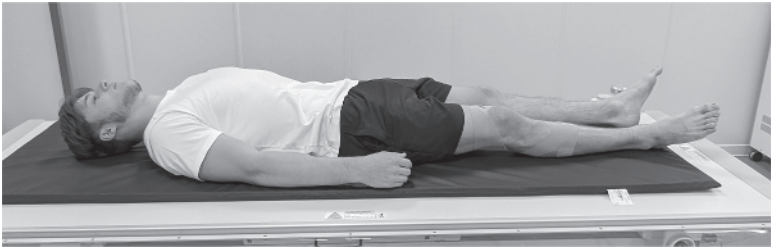


FIGURE 1.8 Supine.

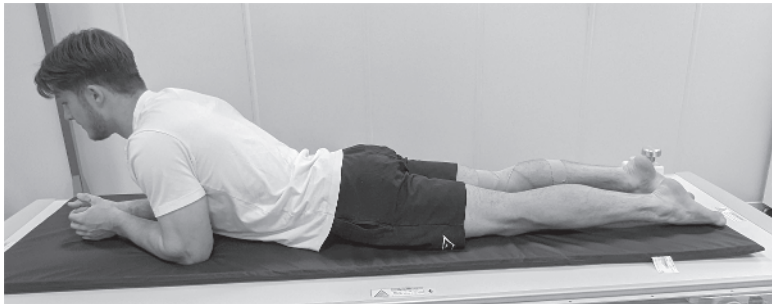


FIGURE 1.9 Prone.



FIGURE 1.10 Lateral decubitus (left).

All these positions can be described more precisely by using a reference to the body planes, which ensures that the patient is accurately positioned, e.g. the patient is lying supine on the bed with the median sagittal plane at 90° to the image receptor (IR).

There are also some terms which are used to describe the anatomical position of the limbs which are explained in the Glossary of Terms at the end of this chapter.

Projection Terminology

A radiographic projection is described by the direction of the central ray in relation to the anatomical position and planes of the body.

Antero-posterior (AP): the central ray enters the anterior aspect of the body, passes through the body parallel to the median sagittal plane and exits from the posterior aspect.

Postero-anterior (PA): the central ray enters the posterior aspect of the body, passes through the body parallel to the median sagittal plane and exits from the anterior aspect.

Lateral (Lat): the central ray passes from one side of the body to the other, parallel to the coronal and axial planes. A right lateral is when the central ray enters the left aspect of the body and exits from the right side and vice versa for a left lateral.

Additional projection terminology, e.g. oblique, can be found in the Glossary of Terms.



FIGURE 1.11 AP projection of the left knee.

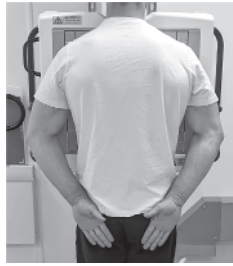


FIGURE 1.12 PA projection of the chest.



FIGURE 1.13 Lateral projection of the foot (right).

To accurately describe a radiographic projection, the following should always be included.

- The position of the patient or area of interest in relation to the IR.
- The movements and degree of movement of the relevant joints, if appropriate.
- The direction and centring of the X-ray beam, e.g. a vertical central ray is centred to the lateral epicondyle
- The X-ray beam angulation relative to a starting point of vertical or horizontal.

In all the chapters, you will find that each radiographic projection has been described using this systematic approach.

Glossary of Terms

Abduct – to move a limb away from the middle of the body.

Adduct – to bring a limb toward the middle of the body.

Align – to place/arrange something in a straight line.

Anatomical position – a common visual reference point, with the person standing erect with feet together and eyes forward, palms face anteriorly with the thumbs pointed away from the body.

Anterior – towards or at the front.

Antero-posterior (AP) – term used to describe a radiographic projection in which the X-ray beam enters the anterior and then exits the posterior aspect of the body.

Artefact – something that appears on the resultant radiographic image that should not be there and detracts from the quality of the image. This could be caused by extraneous material on the patient or positioning aids or result from errors in the image processing.

Axial plane – an anatomical plane that divides the body into superior and inferior sections. Also known as the transverse plane.

Caudal – away from the head.

Contralateral – on the opposite side.

Coronal plane – a vertical plane running from side to side; divides the body or any of its parts into anterior and posterior portions.

Cranial – towards the head.

Decubitus – lying down.

Deep (internal) – away from the body surface.

Deviate – to move a part of the body out of its normal position, e.g. ulnar deviation

Distal – furthest from the origin or further from the point of attachment of a limb to the trunk.

Dorsum – the back or posterior surface, usually used for the hand or foot.

Elevate – to move something superiorly.

Elongation – where an object appears longer than it actually is on a radiographic image; this could be done intentionally to visualise a structure more clearly, e.g. in imaging the scaphoid.

Erect – sitting or standing upright.

Eversion – to move a joint outward or laterally.

Extension – straightening or extending a joint to increase the angle.

External – towards or at the body surface.

External auditory meatus (EAM) – the entrance point to the ear canal.

Flexion – bending or flexing a joint to decrease the angle.

Foreshortening – where an object appears shorter than it actually is on a radiographic image.

Frankfurt plane – a plane used in dental radiography which is a line passing from the lower border of the orbit to the external auditory meatus.

Fronto-occipital – term used to describe a radiographic projection of the skull/head in which the X-ray beam travels through the frontal bone and then the occiput bone.

Horizontal beam lateral (HBL) – a lateral projection in which the patient remains in a fixed position and the X-ray beam is directed with a horizontal beam to obtain a lateral projection.

Image receptor (IR) – the device used to capture the X-rays which pass through the patient to produce a radiograph.

Immobilise – to keep the area of the body being imaged still, which can be by way of equipment or by the patient holding their breath.

Inferior (caudal) – away from the head or toward the lower part of the structure or the body, e.g. the pelvis is inferior to the chest.

Internal – away from the body surface.

Interpupillary line – a line used in skull, facial bone and dental radiography which runs between the pupils of the eyes.

Inversion – to turn a joint inward or medially.

Ipsilateral – on the same side.

Lateral – away from the midline of the body.

Lateral decubitus – lying down on one side.

Medial – towards the middle of the body.

Median sagittal plane – a sagittal plane that bisects the body vertically through the midline, dividing the body exactly into equal left and right halves.

Object-to-image receptor distance (OID) – the distance between the object and the image receptor, affecting magnification.

Oblique – neither parallel nor at right angles to a specified or implied line; slanting.

Occipito-frontal – term used to describe a radiographic projection of the skull/head in which the X-ray beam enters through the occiput bone and exits through the frontal bone.

Occipito-mental – term used to describe a radiographic projection of the skull/head in which the X-ray beam enters through the occiput bone and exits through the symphysis menti of the mandible.

Palmar – the surface on the palm of the hand.

Palpate – examine a part of the body by touch, especially for medical purposes, e.g. positioning for an X-ray examination.

Plantar – the surface of the foot that is in contact with the floor when a person stands.

Posterior – towards or at the back.

Postero-anterior (PA) – term used to describe a radiographic projection in which the X-ray beam enters through the posterior and exits through the anterior aspect of the body.

Prone – lying on the front, face down.

Proximal – towards the origin or closer to the point of attachment of a limb to the trunk.

Radiographic baseline (RBL) – a line used in skull, facial bone and dental radiography which runs from the outer canthus to the external auditory meatus.

Radiolucent – permeable to radiation, such as X-rays. Radiolucent objects allow X-rays to pass through and therefore are not demonstrated on a radiographic image, e.g. air.

Radiopaque – opaque to radiation, such as X-rays. Radiopaque objects absorb instead of block radiation rather than allow it to pass through and therefore are shown on a radiographic image, e.g. metal and bone.

Sagittal plane – a vertical plane which passes through the body longitudinally. It divides the body into a left section and a right section.

Semi-recumbent – between lying and sitting, an upright positioning of the head and torso at an angle of 45°.

Source-to-image receptor distance (SID) – the distance of the X-ray tube from the image receptor, affecting magnification. For most X-ray examinations, this is 100 cm.

Source-to-object distance (SOD) – the distance measured between the focal spot on the target of an X-ray tube and the centre mass of the patient's anatomical organ.

Superficial (external) – towards or at the body surface.

Superimpose – to place or lay a structure over another.

Superior (cranial) – towards the head or upper part of a structure or the body, e.g. the head is superior to the chest.

Supine – lying on the back facing upwards.

Transverse plane – an anatomical plane that divides the body into superior and inferior sections. Also known as the axial plane.