

An anatomical illustration of a human skeleton in a dynamic, athletic pose, possibly a crouch or a running start. The skeleton is rendered in a light blue color, with the bones clearly visible. The figure is positioned diagonally across the frame, with the head at the top right and the legs extending towards the bottom left. The background is a solid dark blue.

# Clinically Oriented **ANATOMY**

Jnanesh S Rayapati

# Clinically Oriented Anatomy





# Clinically Oriented Anatomy

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# Clinically Oriented Anatomy

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*to*

*my wife  
Lakshmi*

*my daughter  
Sachita*

*and*

*my parents  
Dr Sreenathan and Rukmini  
for their support and love*





## Preface

The main aim of this book is to provide a concise yet sufficient material on clinical anatomy. It is written in simple language in a point format. Unnecessary details have been omitted. Facts of clinical importance have been highlighted in distinctive colour.

I hope that this book will be of benefit to undergraduate, postgraduate (graduate) students preparing for examinations as a rapid review. It will be helpful as a review book for students preparing for exams like USMLE, PLAB and All India PG Entrance Examinations. The book focuses on material that is most likely to be tested in these examinations.

The book provides enough information for those wishing to refresh their knowledge of anatomy. I shall be grateful to the readers for their suggestions to improve the book.

*Jnanesh S Rayapati*



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---

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*Jnanesh S Rayapati*

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# 1

# General Anatomy

- *Human anatomy* deals with the structure of the body.
- *Anatomy* = cutting up (Greek word). It is a wide field of study.
- *Dissection* = cut into two (Latin word). It is a technique.
- Anatomy is the basic foundation for the field of medicine.
- It introduces most of the medical terminologies.
- Percussion.
- Auscultation.
- Endoscopy (bronchoscopy, gastroscopy, etc.).
- Radiography.
- Electromyography.

## SUBDIVISIONS OF ANATOMY

1. *Cadaveric anatomy* is studied on dead bodies usually with naked eye (gross anatomy).
  - a. *Regional anatomy*: Body is studied in parts such as upper limb, lower limb, etc.
  - b. *Systemic anatomy*: Body is studied system-wise such as:
    - Skeletal system (osteology).
    - Muscular system (myology).
    - Articular system (arthrology).
    - Vascular system (angiology).
    - Nervous system (neurology).
    - Respiratory, digestive, urogenital and endocrine system (splanchnology).
    - Locomotor system includes osteology, arthrology and myology.
2. *Living anatomy* is studied on living humans:
  - Inspection.
  - Palpation.
3. *Embryology* (*developmental anatomy*): Prenatal (before birth) and postnatal (after birth) developmental changes in an individual.
4. *Histology* (*microscopic anatomy*): Study of the structure with the aid of microscope.
5. *Surface anatomy* (*topographic anatomy*): Study of deeper structures in relation to the skin surface projection. Important in clinical and surgical fields.
6. *Radiographic anatomy*: Study of deeper organs by plain and contrast X-rays.
7. *Comparative anatomy*: Human anatomy compared to that of other animals.
8. *Applied anatomy* (*clinical anatomy*): Application of the anatomical knowledge to the medical and surgical field.

## ANATOMICAL TERMINOLOGY

### Terms of Position

#### *Anatomical Position*

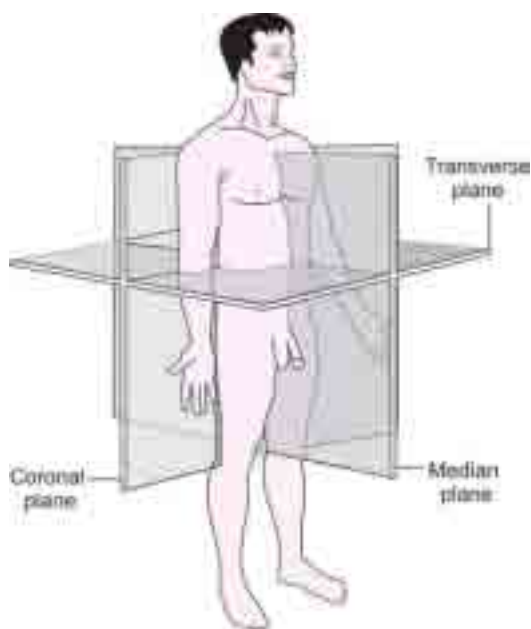
"Anatomical position" represents the basis from which all directions and directional concepts will be developed.

Please note that the subject is standing erect with his eyes looking forward, arms at his side, the palms of the hands facing forward and feet beside each other (Fig. 1.1).

Throughout the course of study, all structures or organs in the body are described in relation to the anatomical position. It is generally assumed that a student of anatomy remembers this basic concept each time a structure is encountered in the course of study.

In the dissection hall, the cadaver is kept on the table in supine or prone position. However, when description of a structure and its relation is to be given, it should be explained in terms of its location in the body in anatomical position. If we do not realize and practise this basic, the subject of anatomy becomes a big puzzle.

- *Erect* is standing up.
- *Recumbent* is lying down.



**Fig. 1.1:** Use of some anatomical terms and body planes

- *Prone* is lying face down.
- *Supine* is lying down, face upwards.
- *Lateral recumbent* is lying on the side. A patient found “left lateral recumbent” is lying down on the left side.
- *Lithotomy position* is lying supine with the hips and knees fully flexed and thighs apart.

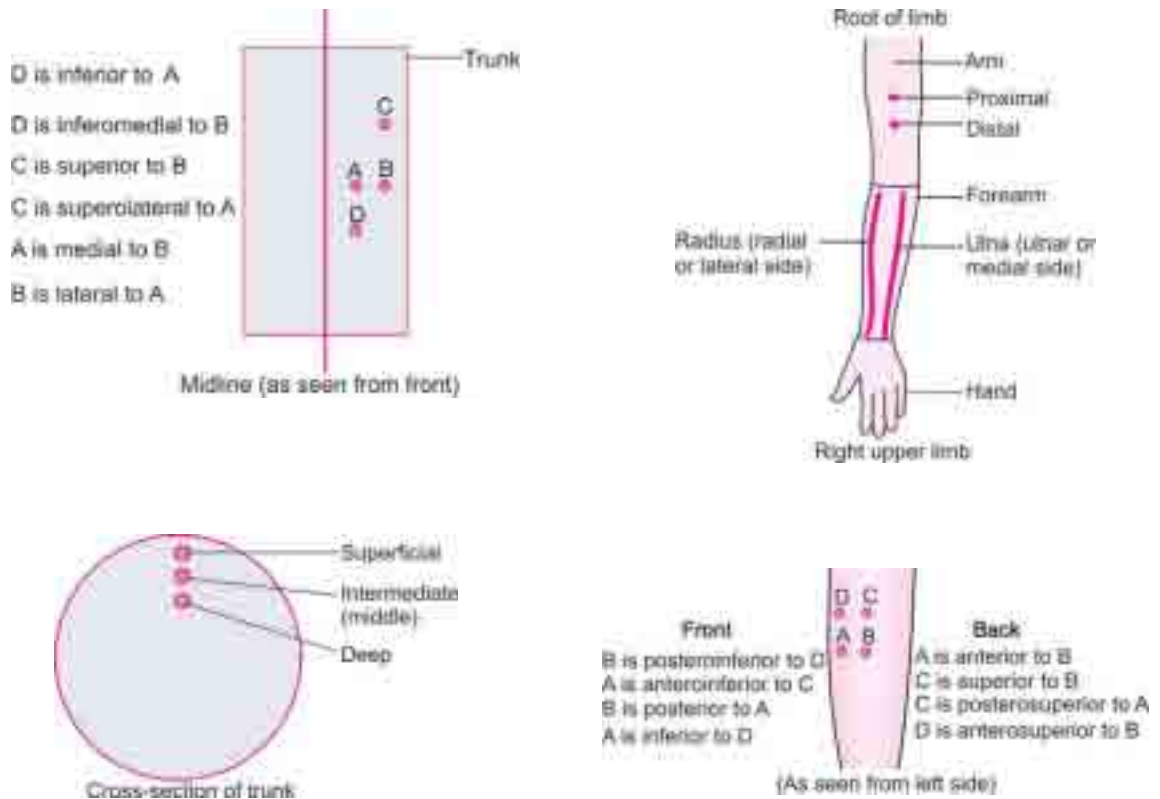
## Anatomical Planes

1. *Median (midsagittal plane) vertical plane:* Divides the body or an organ into left and right halves (Fig. 1.1).
2. *Sagittal plane:* Plane parallel to the median plane.
3. *Coronal plane:* Vertical plane that divides the body or organ into anterior and posterior parts. It is at right angles to the median plane (Fig. 1.1).
4. *Transverse (horizontal) plane:* Divides the body or organ into superior (upper) and inferior (lower) portions (Fig. 1.1).
5. *Oblique plane:* Any other plane.

Sagittal plane	Divides body into left and right parts.
Median plane	Divides body into equal left and right halves.
Coronal plane	Divides body into anterior/posterior.
Transverse plane	Divides body into superior/inferior.

## Other Terms Commonly Used

- *Anterior*—towards front.
- *Posterior*—towards back.
- *Superior*—towards head.
- *Inferior*—towards feet.
- *Medial*—towards the median plane.
- *Lateral*—away from the median plane.
- *Anterosuperior, anteroinferior, posterosuperior, posteroinferior, anterolateral, anteromedial, etc.* are terms used in



**Fig. 1.2:** Use of various anatomical terms

combination (Fig. 1.2).

The anterior surface is the front, and the posterior surface is the back.

- Interior or inner.
- Exterior or outer.
- Invagination or inward protrusion.
- Evagination or outward protrusion.
- Superficial or towards the surface.
- Deep or away from the surface and inwards (Fig. 1.2).

Superior  
Cranial/Rostral  
Anterior

Inferior  
Caudal  
Posterior

Ventral	Dorsal
Proximal	Distal
Medial	Lateral
Superficial	Deep
External	Internal

- There are eight pairs of directional concepts to define. *Left* and *right*, always refers to the patient's left or right. To the left or right of the midline, moving away from it or back toward it, is a concept that defines lateral or medial.
- *Lateral* being farther from the midline, medial being closer to the midline

(Fig. 1.2).

- **Superior** is closer to the head than inferior which is closer to the feet (simply stated higher or lower) (Fig. 1.2).
- **Superficial and deep** are “measurements” of depth from the surface of the skin, and do not need much explanation (Fig. 1.2).
- **Bilateral and unilateral** are used to describe structures or occurrences in the body. Eyes, for example are bilateral (one on either side of the midline) whereas some organs are unilateral (only on one side, e.g. the spleen). A patient might be a bilateral amputee (having lost both legs) or might be experiencing unilateral paralysis secondary to a stroke.
- **Ipsilateral** of the same side.
- **Contralateral** of the opposite side.
- **Ipsilateral** and **contralateral** refer to the same side or different sides.

The following terms are commonly used in embryology, but sometimes in gross anatomy:

- **Ventral and dorsal** refer to the anterior and posterior aspects of the torso. These two terms are also useful to describe aspects of the feet and hands, but more specifically the ventral (inferior) aspect of the foot is referred to as plantar and the ventral (anterior) aspect of the hand as palmar.
- **Cranial or rostral** towards the head.
- **Caudal** towards the tail.

### Terms used for Limbs

- **Proximal** and **distal** refer to directions or relationships between different structures or aspects of the extremities (upper and lower limbs) (Fig. 1.2).
- **Proximal** nearer the trunk.
- **Distal** away from the trunk.
- For example, the elbow is proximal to the

wrist, and the elbow is distal to the shoulder.

- **Radial** outer border in the upper limb.
- **Ulnar** inner border in the upper limb.
- **Tibial** inner border in the lower limb.
- **Fibular** outer border in the lower limb.
- **Flexor surface**: Anterior surface in the upper limb. Posterior surface in the lower limb.
- **Extensor surface**: Posterior surface in the upper limb. Anterior surface in the lower limb.
- **Palmar** (volar) referring to the palm of the hand.
- **Plantar** towards the sole of the foot.

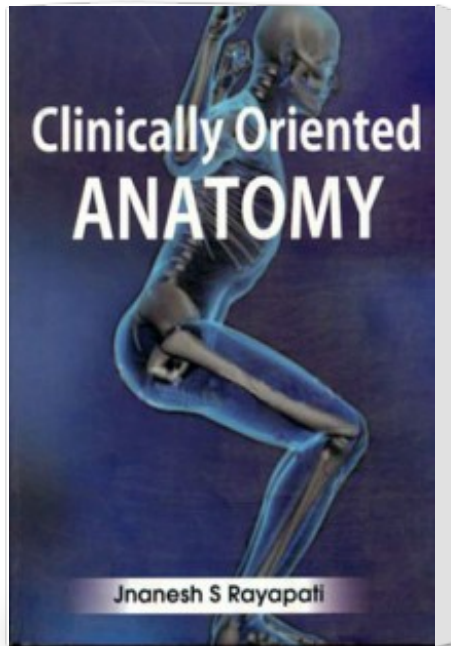
A patient might have pain that originates in an area just superior to the left ear, travels over the superior aspect of the skull and travels down the contralateral aspect of the upper torso (pain starts just above the left ear, goes over the top of the head and down the right side of the body) or a patient may have sustained superficial burns to the medial aspect of the right upper extremity, with superficial and deep burns to lateral aspect of the ipsilateral lower extremity (superficial burns to the inside of the right upper limb and superficial and full thickness burns to the outside of the right lower limb).

That is medical terminology, cool, ok?

### Terms used for describing Movements

- **Flexion** reduces joint angle. Approximation of flexor surfaces.
- **Extension** increases joint angle. Approximation of extensor surfaces.
- **Abduction** moves away from body midline.
- **Adduction** moves closer to body midline.
- **Medial rotation** inward rotation toward midline on the body.
- **Lateral rotation** outward rotation away from midline on the body.
- **Circumduction** combination of the above movements.

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