

CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY

Rachel Koshi

UPPER AND LOWER LIMBS

16th Edition

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CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY

Volume 1

Cunningham's Manual of Practical Anatomy

Volume 1 Upper and lower limbs

Volume 2 Thorax and abdomen

Volume 3 Head and neck

CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY

Sixteenth edition

Volume 1 Upper and lower limbs

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contained in any third party website referenced in this work.

I fondly dedicate this book to the late Dr K G Koshi for his encouragement and support when I chose a career in anatomy; and to Dr Mary Jacob, under whose guidance I learned the subject and developed a love for teaching.

Foreword

It gives me great pleasure to pen down the Foreword to the 16th edition of *Cunningham's Manual of Practical Anatomy*. Just as the curriculum of anatomy is incomplete without dissection, so also learning by dissection is incomplete without a manual.

Cunningham's Manual of Practical Anatomy is one of the oldest dissectors, the first edition of which was published as early as 1893. Since then, the manual has been an inseparable companion to students during dissection.

I remember my days as a first MBBS student, the only dissector known in those days was *Cunningham's* manual. The manual helped me to dissect scientifically, step by step, explore the body, see all structures as mentioned, and admire God's highest creation—the human body—so perfectly. As a postgraduate student I marvelled at the manual and learnt details of structures, in a way as if I had my teacher with me telling me what to do next. The clearly defined steps of dissection, and the comprehensive revision tables at the end, helped me personally to develop a liking for dissection and the subject of anatomy.

Today, as a Professor and Head of Anatomy, teaching anatomy for more than 30 years, I find *Cunningham's* manual extremely useful to all the students dissecting and learning anatomy.

With the explosion of knowledge and ongoing curricular changes, the manual has been revised at frequent intervals.

The 16th edition is more student friendly. The language is simplified, so that the book can be comprehended by one and all. The objectives are well defined. The clinical application notes at the end of each chapter are an academic feast to the learners. The lucidly enumerated steps of dissection make a student explore various structures, the layout, and relations and compare them with the simplified labelled illustrations in the manual. This helps in sequential dissection in a scientific way and for knowledge retention. The text also includes multiple-choice questions for self-assessment and holistic comprehension.

Keeping the concept of 'Adult Learning Principles' in mind, i.e. adults learn when they 'DO', and with a global movement towards 'Competency - based Curriculum', students learn anatomy when they dissect; *Cunningham's* manual will help students to dissect on their own, at their own speed and time, and become competent doctors, who can cater to the needs of the society in a much better way.

I recommend this invaluable manual to all the learners who want to master the subject of anatomy.

Dr Pritha S Bhuiyan

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Preface to the sixteenth edition

Cunningham's Manual of Practical Anatomy has been the most widely used dissection manual in India for many decades. This edition is extensively revised to meet the needs of the present-day medical student.

Firstly, at the start of each chapter and at the beginning of the description of a region, introductory remarks have been added in order to provide context to the whole human body and to the practice of medicine. In order to appreciate the 'big picture', Chapter 1 (General introduction) has been expanded and supplemented by new artwork. Throughout all three volumes, all anatomical terms are updated and explained using the latest terminology, and the language has been modernized.

Dissection forms an integral part of learning anatomy, and the practice of dissection enables students to retain and recall anatomical details learnt in the first year of medical school during their clinical practice. To make the dissection process easier and more meaningful, in this edition, each dissection is presented with a heading, and a list of objectives to be accomplished. The details of dissections have been retained from the earlier edition but are presented as numbered, stepwise easy-to-follow instructions that help students navigate their way through the tissues of the body, and to isolate, define, and study important anatomical structures.

This manual contains a number of old and new features that enable students to integrate the anatomy learnt in the dissection hall with clinical practice. Each region has images of living anatomy to help students identify on the

skin surface bony or soft tissue landmarks that lie beneath. Numerous X-rays and magnetic resonance imaging further enable the student to visualize internal structures in the living. Matters of clinical importance, when mentioned in the text, are highlighted.

A brand new feature of this edition is the presentation of one or more clinical application notes at the end of each chapter. Some of these notes focus attention on the anatomical basis of commonly used physical diagnostic tests such as palpation of the arterial pulse or measurement of blood pressure. Others deal with the underlying anatomy of clinical findings in diseases such as breast cancer or the cervical rib syndrome. Common joint injuries to the knee and other limb joints are discussed with reference to the intra- and periarticular structures described and dissected. Effects of some common nerve injuries along the course of the nerve are described in a clinical context. Many clinical application notes are in a Q&A format that challenges the student to brainstorm the material covered in the chapter. Multiple-choice questions on each section are included at the end to help students assess their preparedness for the university examination.

It is hoped that this new edition respects the legacy of Cunningham in producing a text and manual that is accurate, student friendly, comprehensive, and interesting, and that it will serve the community of students who are beginning their career in medicine to gain knowledge and appreciation of the anatomy of the human body.

Dr Rachel Koshi

Contributors

Dr J Suganthy, Professor of Anatomy, Christian Medical College, Vellore, India.

Dr Suganthy wrote the MCQs, reviewed manuscripts, and provided help and advice with the artwork, and most importantly gave much moral support.

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PART 1

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CHAPTER 1

General introduction

Human anatomy is the study of the structure of the human body. For descriptive purposes, the human body is divided into regions: head, neck, trunk, and limbs. The trunk is subdivided into the chest or thorax and the abdomen. The abdomen is further subdivided into the abdomen proper and the pelvis. As you dissect the body, region by region, you will acquire first-hand knowledge of the relative positions of structures in the body. But before you begin, you need a vocabulary to define the positions of each anatomical structure, and also an elementary knowledge of the kinds of structures you will encounter.

Terms of position

The body usually lies horizontally on a table during dissection, but the dissector must remember that terms describing positions are always used as though the body is in the **anatomical position**. In this position, the person is standing upright, with the upper limbs by the sides and palms of the hands directed forwards.

Descriptive terms are used to indicate the position of structures as if the body were in the anatomical position [Fig. 1.1]. **Superior** or **cephalic** refers to the position of a part that is nearer the head, while **inferior** means nearer the feet. **Caudal** (towards the tail) can replace inferior in the trunk. **Anterior** means nearer the front of the body, and **posterior** means nearer the back. **Ventral** and **dorsal** may be used instead of anterior and posterior in the trunk and have the advantage of being appropriate also for four-legged animals (*venter* = belly; *dorsum* = back). In the hand, **dorsal** commonly replaces

posterior, and **palmar** replaces anterior. In the foot, the corresponding surfaces are superior and inferior in the anatomical position, but these terms are usually replaced by **dorsal** (**dorsum** of the foot) and **plantar** (*planta* = the sole).

Median means in the middle. Thus, the **median plane** is an imaginary plane that divides the body into two equal halves, right and left. Where the median plane meets the anterior and posterior surfaces of the body are the **anterior** and **posterior median lines**. A structure is said to be median when it is bisected by the median plane. **Medial** means nearer the median plane, and **lateral** means further away from that plane. The presence of two bones, one lateral and the other medial, in the forearm (radius and ulna) and leg (fibula and tibia) have resulted in the terms **ulnar** or **radial** side of the forearm, and **tibial** or **fibular** side of the leg. The words outer and inner, or their equivalents **external** and **internal**, are used only in the sense of nearer the surface or further away from it in any direction; they are not synonymous with medial and lateral. **Superficial**, meaning nearer the skin, and **deep**, meaning further from it, are the terms most usually used when direction is of no importance. When describing the surfaces of a hollow organ, **external** refers to the outer surface, and **internal** to the inner surface.

A **sagittal plane** may pass through any part of the body, parallel to the median plane. A **coronal plane** is a vertical plane at right angle to the median plane. A transverse plane is a horizontal plane (perpendicular to both the above). All other planes are oblique planes.

Proximal (nearer to) and **distal** (further from) indicate the relative distances of structures from the root of that structure, e.g. the relative distance

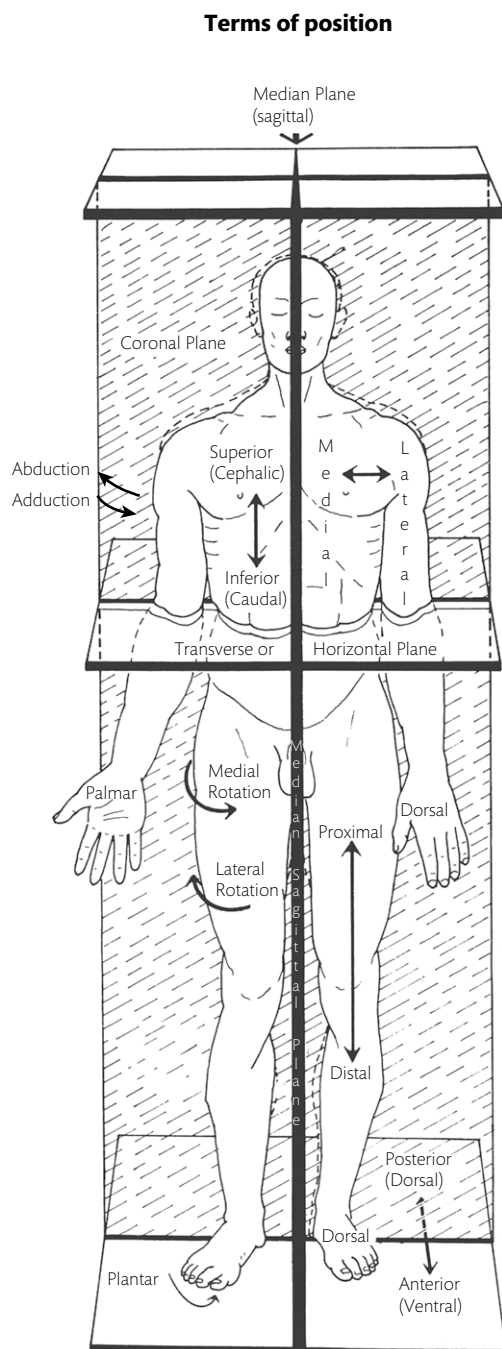


Fig. 1.1 Diagram illustrating some anatomical terms of position and movement.

of the elbow from the root of the upper limb. Middle, or its Latin equivalent *medius*, is used to indicate a position between superior and inferior or between anterior and posterior. **Intermediate** is used to indicate a position between lateral and medial.

The terms **superolateral** and **inferomedial**, or **anteroinferior** and **posterosuperior**, or any other combination of the standard terms, may be used to show intermediate positions.

Terms of movement

Movements take place at joints and may occur in any plane, but are usually described in the sagittal and coronal planes [Fig. 1.1]. Movements of the trunk in the sagittal plane are **flexion** (bending anteriorly) and **extension** (straightening or bending posteriorly). In the limbs, flexion is the movement which carries the limb anteriorly and folds it; extension is the movement which carries it posteriorly and straightens it. (Note flexion and extension for the knee joint do not follow this rule. Flexion of the knee folds the limb but results in the leg being carried posteriorly.) At the ankle, the terms used are **plantar flexion** (movement towards the sole) and **dorsiflexion** (movement towards the dorsum). Movements of the trunk in the coronal plane (i.e. side-to-side movement) are known as **lateral flexion**. Movement of the limb away from the median plane is abduction, and movement towards the median plane is **adduction**. In keeping with this definition, at the wrist, abduction refers to movement of the hand away from the median plane towards the radial (thumb) side. Abduction of the wrist is also referred to as **radial deviation**. Similarly, adduction of the wrist is also referred to as **ulnar deviation**. In the fingers and toes, abduction means the spreading apart of, and adduction the drawing together of, the digits. In the hand, this movement is in reference to the line of the middle finger. In the foot, it is in reference to the line of the second toe. The thumb lies at right angles to the fingers. Hence, abduction and adduction carry the thumb anteriorly and posteriorly, respectively.

Rotation is the term applied to the movement in which a part of the body is turned around its own longitudinal axis. In the limbs, lateral and medial rotation refers to the direction of movement of the anterior surface. (When the front of the arm or thigh is turned laterally, it is lateral rotation, and, when turned medially, it is medial rotation.) A special movement in the forearm is the rotation of the radius on the stationary ulna. This movement is **pronation**. The hand moves with the radius and