

Rachel Koshi
THORAX AND
ABDOMEN
16th Edition

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CUNNINGHAM'S MANUAL OF PRACTICAL ANATOMY

Volume 2

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 2 Thorax and abdomen

Dr Rachel Koshi MBBS, MS, PhD

Professor of Anatomy
Apollo Institute of Medical Sciences and Research
Chittoor, India

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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

Professor and Head, Department of Anatomy
Professor and Coordinator, Department of Medical Education
Seth GS Medical College and KEM Hospital, Parel, Mumbai

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. All anatomical terms are updated using the latest terminology. The language has been modernized and simplified to appeal to the present-day student. Opening remarks have been added at the start of a chapter, or at the beginning of the description of a region where necessary. This volume on the thorax, abdomen, and pelvis and perineum starts with an introduction to the trunk, or torso, defines the boundaries of each constituent part, and provides a general overview of the vertebrae, vertebral column, and autonomic nervous system which are common to all sections of the trunk. The last section in the volume collates and organizes information from the earlier sections to enable further understanding of the body as a whole. Bearing in mind that most examinations test a comprehensive understanding of developmental and microscopic anatomy, the brief sections pertaining to these areas have been removed. Students are requested to read books devoted to these topics. In situations where adult anatomy is better explained based on development, the relevant embryology is briefly described.

Dissection forms an integral part of learning anatomy, and the practice of dissections 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 organs.

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, CTs, and MRIs 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 superficial abdominal reflexes. Others deal with the underlying anatomy of clinical findings in diseases such as flail chest, abdominal hernias, and obstructive jaundice. The clinical anatomy of common procedures, such as vasectomy and thoracotomy, are described. 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's* 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.

Dr Aparna Irodi, Professor of Radiology, Christian Medical College and Hospital, Vellore, India.

Dr Irodi kindly researched, identified, and explained the radiology images.

Dr Ivan James Prithishkumar, Professor of Anatomy, Christian Medical College, Vellore, India.

Dr Prithishkumar wrote some of the clinical applications and reviewed the text as a critical reader.

Dr Tripti Meriel Jacob, Associate Professor of Anatomy, Christian Medical College, Vellore, India.

Dr Jacob wrote some of the clinical applications, reviewed the text as a critical reader, and provided advice and assistance with the artwork.

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Reviewers

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Dr TS Roy, MD, PhD, Professor and Head, Department of Anatomy, All India Institute of Medical Sciences, New Delhi 110029, India.

Dr Chittapuram Srinivasan Ramesh Babu (CS Ramesh Babu), Associate Professor of Anatomy, Muzaffarnagar Medical College, India.

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PART 1

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CHAPTER 1

Introduction to the trunk

The **trunk** or **torso** is an anatomical term for the central part of the human body. It includes the thorax, abdomen, pelvis, and perineum. It does not include the head and neck or upper and lower limbs.

Parts of the trunk

The upper part of the trunk is the thorax. It is separated from the more inferiorly placed abdomen by the diaphragm. The lower part of the abdomen lies in the greater pelvis and is continuous posteriorly and inferiorly with the lesser pelvis or true pelvis. The V-shaped floor of the pelvis is the **pelvic diaphragm**. The part of the trunk inferior to the pelvic diaphragm is the **perineum** [Fig. 1.1].

Superiorly the trunk is continuous with the neck. The upper limbs are attached to the upper part of the torso, and muscles of the upper limb overlap the thoracic cage. The lower limbs articulate with the bony pelvis and posteriorly overlap with abdominal and pelvic organs.

Most critical organs are placed within the trunk. In the thorax are the heart and lungs, protected by the rib cage. Most of the gastrointestinal tract and the liver, spleen, pancreas, and kidneys are located in the abdomen. Finally, the pelvis contains the male and female reproductive organs, the urinary bladder, and the terminal part of the gastrointestinal tract.

The posterior aspect of the trunk is the back, which includes the vertebral column, the deep muscles of the back, and the thoracolumbar fascia.

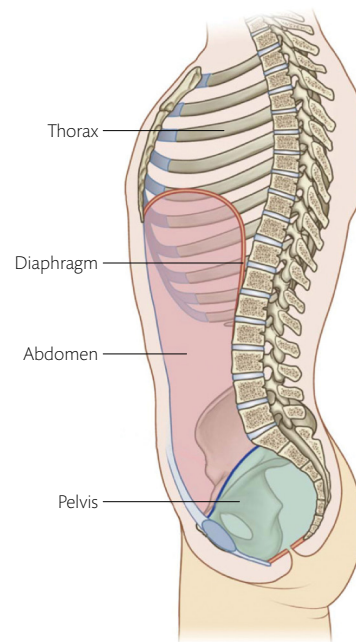


Fig. 1.1 Schematic longitudinal section through the trunk showing the position of the thorax, abdomen, and pelvis.

This figure was published in *Gray's Anatomy for Students*, 2nd Edition, Drake R et al. Copyright © Elsevier (2009).

Vertebral column

The vertebral column consists of 33 vertebrae arranged one above the other. There are seven cervical, 12 thoracic, five lumbar, five sacral, and four coccygeal vertebrae. The five sacral vertebrae are fused together to form the sacrum, and the coccygeal vertebrae are fused to form the coccyx. The vertebrae articulate with each other at the intervertebral discs and the facet joints [Figs. 1.2A and 1.2B].

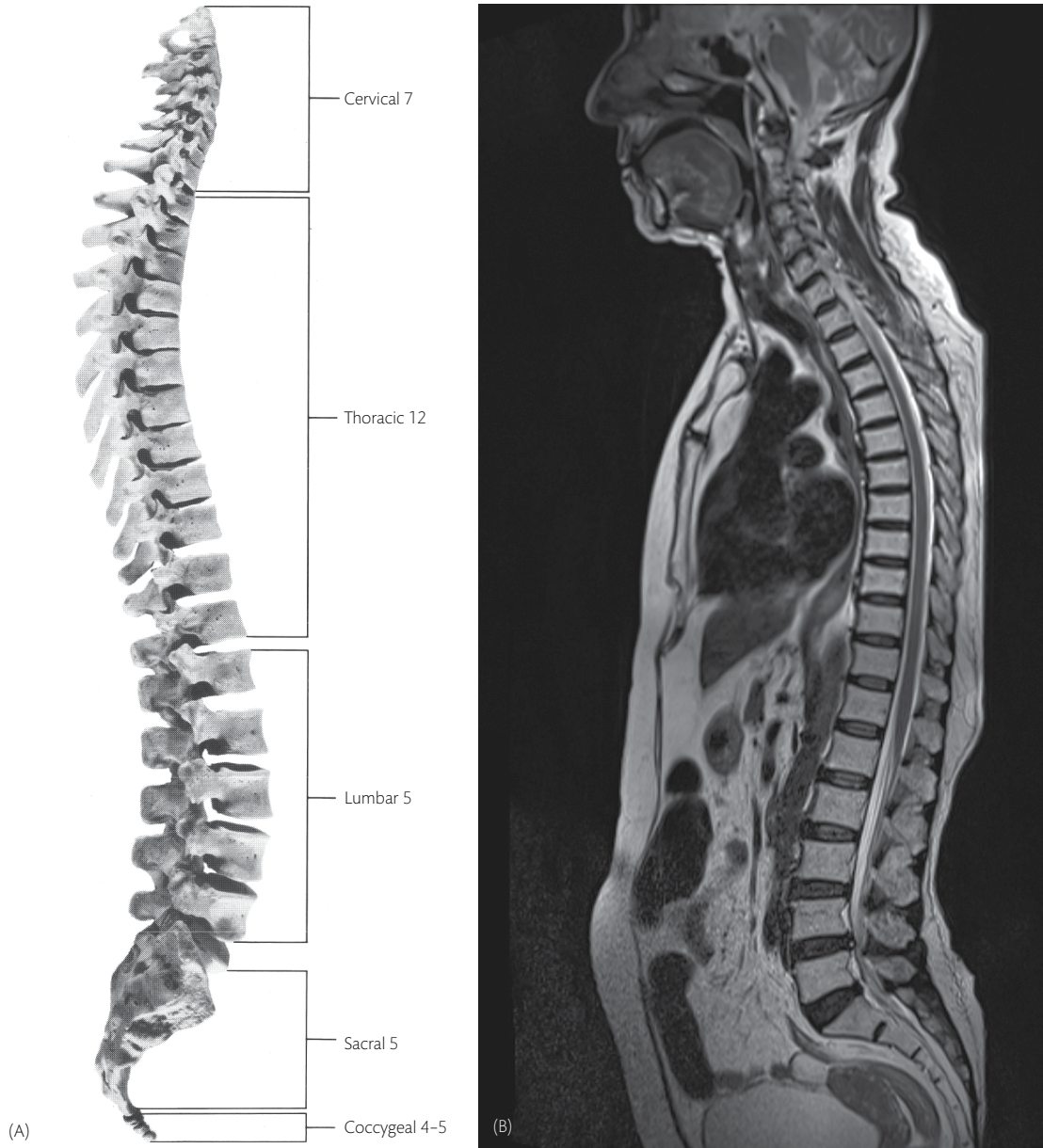


Fig. 1.2 (A) The vertebral column seen from the right side. (B) MRI of the vertebral column.

Typical vertebra

A typical vertebra has the following elements [Figs. 1.3 and 1.4]—a **vertebral body** which lies anteriorly and the vertebral arch, made up of the **pedicles** and **laminae**, which lies posteriorly. Surrounded by the body and vertebral arch is the **vertebral foramen**. The **vertebral arch** consists of a pedicle and a lamina on each side. The **pedicle** forms the lateral wall of the vertebral foramen. It extends backwards from the posterolateral surface of the body to the base of

the laterally projecting transverse process [Fig. 1.3]. At this point, where the pedicle meets the transverse process, it also meets the **lamina**. The two laminae form the posterior limit of the vertebral foramen. Each lamina passes medially and backwards from the junction of the transverse process and the pedicle to join its fellow at the base of the spine. The **spine** is long and projects downwards and backwards in the mid-line so that its tip is palpable. Together the vertebral foramina of all the vertebrae make up the **vertebral**