CLINICAL ANATOMY

A revision and applied anatomy for clinical students

HAROLD ELLIS

SEVENTH EDITION

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Blackwell Scientific Publications
OXFORD LONDON EDINBURGH
BOSTON MELBOURNE

Editorial offices:
Osney Mead, Oxford OX2 0EL
8 John Street, London WC1N 2ES
9 Forrest Road, Edinburgh EH1 2QH
52 Beacon Street, Boston
Massachusetts 02108, USA
99 Barry Street, Carlton
Victoria 3053, Australia

First published 1960
Second edition 1962
Reprinted 1963
Third edition 1966
Fourth edition 1969
Fifth edition 1971
Reprinted 1972, 1973, 1974
Sixth edition 1977
Reprinted 1978, 1980
Seventh edition 1983

Greek edition 1969

Printed and bound
in Great Britain by
Butler & Tanner Ltd
Frome, Somerset

DISTRIBUTORS

USA
Blackwell Mosby Book Distributors
11830 Westline Industrial Drive
St Louis, Missouri 63141

Canada
Blackwell Mosby Book Distributors
120 Melford Drive, Scarborough
Ontario, M1B 2X4

Australia
Blackwell Scientific Book Distributors
31 Advantage Road, Highett
Victoria 3190

British Library
Cataloguing in Publication Data

Ellis, Harold, *1926-*
Clinical anatomy.—7th ed
1. Anatomy, Pathological
I. Title
616.07 RB25

ISBN 0-632-00947-0

Preface to the Seventh Edition

Experience of teaching clinical students at three medical schools and of examining them in thirteen cities and in seven countries has convinced me that there is still an unfortunate hiatus between the anatomy which the student learns in his pre-clinical years and that which he later encounters in the wards and operating theatres.

This book attempts to counter this situation. It does so by highlighting those features of anatomy which are of clinical importance, in radiology, pathology, medicine and midwifery as well as in surgery. It presents the facts which a student might reasonably be expected to carry with him during his years on the wards, through his final examinations and into his postgraduate years; it is designed for the clinical student.

Anatomy is a vast subject and, therefore, in order to achieve this goal, I have deliberately carried out a rigorous selection of material so as to cover only those of its thousands of facts which I consider form the necessary anatomical scaffolding for the clinician. Wherever possible practical applications are indicated throughout the text—they cannot, within the limitations of a book of this size, be exhaustive, but I hope that they will act as signposts to the student and indicate how many clinical phenomena can be understood and remembered on simple anatomical grounds.

In this seventh edition a complete revision of the text has been carried out. Many pages have been re-drafted and a new section added on Central Venous Catheterization. Twelve new figures have been added and many other illustrations modified, replaced or enlarged. Representative computerized axial tomography films of the abdomen and head have been included, since this technique has given increased impetus to the clinical importance of topographical anatomy. For the first time, colour has been added for greater clarity.

The continued success of this volume owes much to the helpful comments which the author has received from readers all over the world. Every suggestion is given the most careful consideration in an attempt to keep the material abreast of the needs of today's medical students.

Westminster Medical School 1983 HAROLD ELLIS

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THE ABDOMEN AND PELVIS

Acknowledgements

I wish to thank my colleagues—the registrars, house surgeons and dressers at Westminster Hospital—who have kindly perused and commented on the text and have given valuable help in proof-reading.

The CAT scans were kindly provided by Dr Fritz Starer of the Department of Radiology at Westminster Hospital.

I am grateful to the following authors for permission to reproduce illustrations:
The late Lord Brock for Figs 20 and 21 (from *Lung Abscess*);
Professor R. G. Harrison for Figs 12, 32 and 69 (from *A Textbook of Human Embryology*);
and Professor Sheila Sherlock for Fig. 71 (from *Diseases of the Liver and Biliary System*).

To Miss Gill Baker go my grateful thanks for invaluable secretarial assistance. Finally, I wish to express my debt to Mr Per Saugman and the staff of Blackwell Scientific Publications for their continued and unfailing help.

H. E.

Part 1
THE THORAX

Surface anatomy and surface markings

The experienced clinician spends much of his working life relating the surface anatomy of his patients to their deep structures (Fig. 1).

The following bony prominences can usually be palpated in the living subject (corresponding vertebral levels are given in brackets):

- superior angle of the scapula (T2);
- upper border of the manubrium sterni, the suprasternal notch (T2/3);
- spine of the scapula (T3);
- sternal angle (of Louis)—the transverse ridge at the manubrio-sternal junction (T4/5);
- inferior angle of scapula (T8);
- xiphisternal joint (T9);
- lowest part of costal margin—10th rib (L3).

Note from Fig. 1 that the manubrium corresponds to the 3rd and 4th

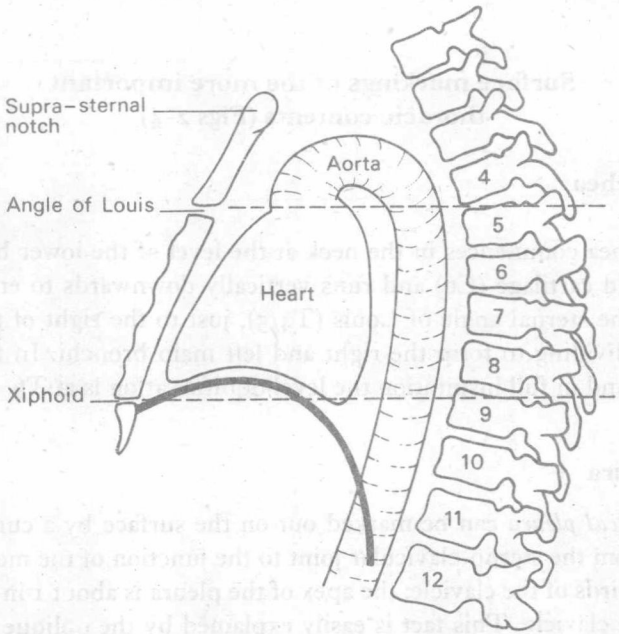

Fig. 1. Lateral view of the thorax—its surface markings and vertebral levels. (Note that the angle of Louis (T4/5) demarcates the superior mediastinum, the upper margin of the heart and the beginning and end of the aortic arch.)

thoracic vertebrae and overlies the aortic arch, and that the sternum corresponds to the 5th to 8th vertebrae and neatly overlies the heart.

Since the 1st and 12th ribs are difficult to feel, the ribs should be enumerated from the 2nd costal cartilage, which articulates with the sternum at the angle of Louis.

The spinous processes of all the thoracic vertebrae can be palpated in the mid-line posteriorly, but it should be remembered that the first spinous process which can be felt is that of C7 (the vertebra prominens).

The position of the *nipple* varies considerably in the female, but in the male it usually lies in the 4th intercostal space about 4 in (10 cm) from the mid-line. The *apex beat*, which marks the lowest and outermost point at which the cardiac impulse can be palpated, is normally in the 5th intercostal space $3\frac{1}{2}$ in (9 cm) from the mid-line. (Just below and medial to the nipple.)

The *trachea* is palpable in the suprasternal notch midway between the heads of the two clavicles.

Surface markings of the more important thoracic contents (Figs 2–4)

The trachea

The trachea commences in the neck at the level of the lower border of the cricoid cartilage (C6) and runs vertically downwards to end at the level of the sternal angle of Louis (T4/5), just to the right of the mid-line, by dividing to form the right and left main bronchi. In the erect position and in full inspiration the level of bifurcation is at T6.

The pleura

The *cervical pleura* can be marked out on the surface by a curved line drawn from the sterno-clavicular joint to the junction of the medial and middle thirds of the clavicle; the apex of the pleura is about 1 in (2.5 cm) above the clavicle. This fact is easily explained by the oblique slope of the first rib. It is important because the pleura can be wounded (with consequent pneumothorax) by a stab wound—and this includes the surgeon's knife and the anaesthetist's needle—above the clavicle.

The lines of pleural reflexion pass from behind the sterno-clavicular joint on each side to meet in the mid-line at the 2nd costal cartilage (the angle of Louis). The pleural edge then passes vertically downwards to the 6th costal cartilage and then crosses:

- the 8th rib in the mid-clavicular line;
- the 10th rib in the mid-axillary line; and
- the 12th rib at the lateral border of the erector spinae.

The pleura actually descends just below the 12th rib margin at its medial extremity—or even below the edge of the 11th rib if the 12th is unusually short; obviously in this situation the pleura may be opened accidentally in making a loin incision to expose the kidney, perform an adrenalectomy or to drain a subphrenic abscess.

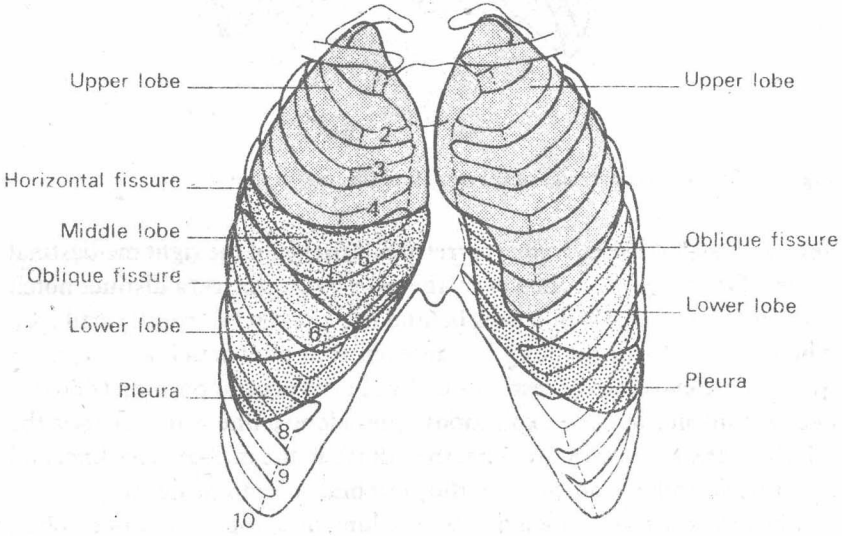

Fig. 2. The surface markings of the lungs and pleura—anterior view.

The lungs

The surface projection of the lung is somewhat less extensive than that of the parietal pleura as outlined above, and in addition it varies quite considerably with the phase of respiration. The *apex* of the lung closely follows the line of the cervical pleura and the surface marking of the

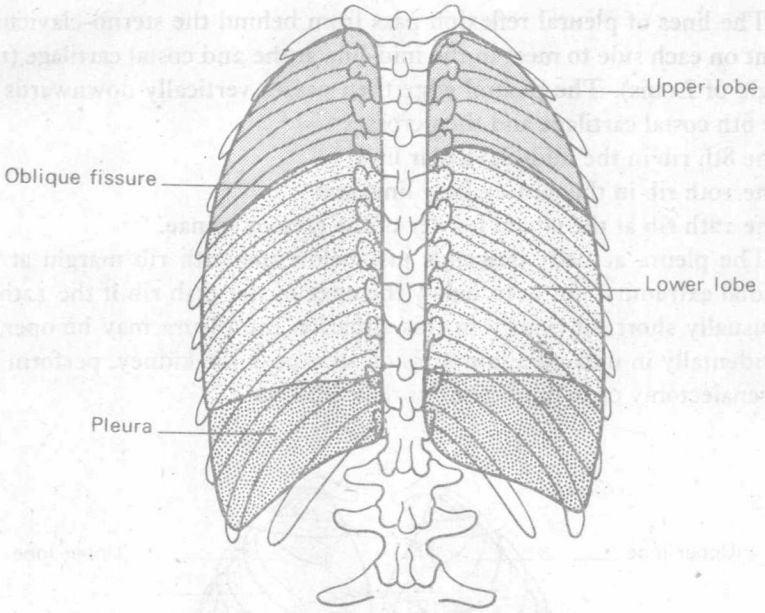

Fig. 3. The surface markings of the lungs and pleura—posterior view.

anterior border of the right lung corresponds to that of the right mediastinal pleura. On the left side, however, the *anterior border* has a distinct notch (the *cardiac notch*) which passes behind the 5th and 6th costal cartilages. The *lower border* of the lung has an excursion of as much as 2–3 in (5–8 cm) in the extremes of respiration, but in the neutral position (midway between inspiration and expiration) it lies along a line which crosses the 6th rib in the mid-clavicular line, the 8th rib in the mid-axillary line, and reaches the 10th rib adjacent to the vertebral column posteriorly.

The *oblique fissure*, which divides the lung into upper and lower lobes, is indicated on the surface by a line drawn obliquely downwards and outwards from 1 in (2.5 cm) lateral to the spine of the 5th thoracic vertebra to the 6th costal cartilage about 1½ in (4 cm) from the mid-line. This can be represented approximately by abducting the shoulder to its full extent; the line of the oblique fissure then corresponds to the position of the medial border of the scapula.

The surface marking of the *transverse fissure* (separating the middle and upper lobes of the right lung) is a line drawn horizontally along the