Chapter 1: Introduction

Anatomy is the science of the structure of the body. When used without qualification, the term is applied usually to human anatomy. The word is derived indirectly from the Greek anatome, a term built from ana, meaning "up," and tome, meaning "a cutting" (compare the words tome, microtome, and epitome). From an etymological point of view, the term" dissection" (dis-, meaning" asunder, " and secare, meaning "to cut") is the Latin equivalent of the Greek anatome.

Anatomy, wrote Vesalius in the preface to his De Fabrica (1543), "should rightly be regarded as the firm foundation of the hole art of medicine and its essential preliminary." Moreover, the study of anatomy introduces the student to the greater part of medical terminology.

Anatomy "is to physiology as geography is to history" (Femel); that is, it provides the setting for the events. Although the primary concern of anatomy is with structure, structure and function should be considered together. Moreover, by means of surface and radiological anatomy, emphasis should be placed on the anatomy of the living body. As Whitnall expressed it, "I cannot put before you too strongly the value and interest of this rather neglected [surface] aspect of anatomy. Many a student first realizes its importance only when brought to the bedside or the operating table of his patient, when the first thing he is faced with is the last and least he has considered." The classical methods of physical examination of the body and the use of some of the various "-scopes," e.g., the stethoscope and the ophthalmoscope, should be included. Radiological studies facilitate achievement of "an understanding of the fluid character of anatomy and physiology of the living" (A.E. Barclay), and the importance of variation should be kept in mind.

In relation to the size of the parts studied, anatomy is usually divided into (1) macroscopic or gross anatomy, and (2) microscopic anatomy or histology (now used synonymously). In addition, embryology is the study of the embryo and the fetus, that is, the study of prenatal development, whereas the study of congenital malformations is known as teratology.

In general, works dealing with human anatomy are arranged either (1) systemically, that is, according to the various systems of the body (skeletal, muscular, digestive, etc.) or (2) regionally, that is, according to the natural, main subdivisions of the body (head and neck, upper limb, thorax, etc.). In this book, after the general features of certain systems have been discussed in introductory chapters, the remainder of the work will general follow a regional approach. The regional plan has been adopted chiefly because the vast majority of laboratory courses in human anatomy are based on regional dissection.

Anatomical terminology

A discussion of etymology of many of the common terms used in anatomy is included in this online text. However, the following etymological works are recommended:

Field, E. J., and Harrison, R. J., Anatomical Terms: Their Origin and Derivation, 3rd ed., Heffer, Cambridge, 1968.

Skinner, H. A., The Origin of Medical Terms, 2nd ed., Williams & Wilkins, Baltimore, 1961.

International agreement has been reached on an English and Latin nomenclature, the Terminologia Anatomica. A revision of this terminology is used in this book. Eponyms are avoided except where so common in clinical practice as to be considered essential for the medical student.

Terms of position and direction (fig. 1-1)

All descriptions in human anatomy are expressed in relation to the anatomical position, a convention whereby the body is erect, with the head, eyes, and toes directed forward and the upper limbs by the side and held so that the palms of the hands face forward. There is no implication that the anatomical position is one of rest. It is often necessary, however, to describe the position of the viscera also in the recumbent posture, because this is a posture in which patients are frequently examined clinically.

The median plane is an imaginary vertical plane of section that passes longitudinally through the body and divides it into right and left halves. The median plane intersects the surface of the front and back of the body at what are called the anterior and posterior me dian lines. It is a common error, however, to refer to the" midline" when the median plane is meant.

Any vertical plane through the body that is parallel with the median plane is called a sagittal plane. The sagittal planes are named after the sagittal suture of the skull, to which they are parallel. The term "parasagittal" is redundant: anything parallel with a sagittal plane is still sagittal.

Any vertical plane that intersects the median plane at a right angle and separates the body into anterior and posterior parts is termed a coronal, or frontal, plane.

The term horizontal plane refers to a plane at a right angle to both the median and coronal planes: it separates the body into superior and inferior parts. This is often termed an axial plane, particularly in radiology.

The term transverse means at a right angle to the longitudinal axis of a structure. Thus, a transverse section through an artery is not necessarily horizontal. A transverse section through the hand is horizontal, whereas a transverse section through the foot is coronal (fig. 1-1).

The term medial means nearer to the median plane, and lateral means farther from it. Thus, in the anatomical position, the thumb is lateral to the little finger, whereas the big toe is medial to the little toe. Intermediate means lying between two structures, one of which is medial and the other lateral. In the upper limb radial means lateral and ulnar means medial: in the lower limb fibular or peroneal means lateral and tibial means medial. The border of a limb on which either the thumb or the big toe is situated is sometimes called preaxial, and the opposite border, postaxial. These two terms are based on the arrangement of the limbs in the embryo during the sixth postovulatory week, when the thumbs and the big toes are both on the rostral border of the limbs (see figs. 8-10 and 15-11).

Medial and lateral rotation (which should never be referred to as internal and external) means rotation (e.g., of the hip) around a vertical axis so that the anterior aspect of the part moves medially or laterally, respectively.

Anterior or ventral means nearer the front of the body. Posterior or dorsal means nearer the back. In the upper limb the term palmar (formerly volar) means anterior. In the foot, plantar means inferior, and the term dorsal is commonly used for superior in the foot.

Superior means nearer the top or upper end of the body. Inferior means nearer the lower end. Cranial or cephalic is sometimes used in stead of superior, and caudal instead of inferior. Rostral means nearer the "front end," that is, the region of the nose and mouth. this is superior in the most of the body althoug it represents the anterior aspect of the head.

The suffix "-ad" is sometimes added to a positional term to indicate the idea of motion. Thus, cephalad means proceeding toward the head. Such terms are useful occasionally in describing growth processes, but their application is best limited.

In the limbs, proximal and distal are used to indicate, respectively, nearer to and farther from the root or attached end of the limb. (Proximal and distal have a special meaning in the case of the teeth.)

Internal and external mean, respectively, nearer to and farther from the center of an organ or a cavity. Superficial and deep mean, respectively, nearer to and farther from the surface of the body.

The term middle is used for a structure lying between two others that are anterior and posterior, or superior and inferior, or internal and external.

In addition to the technical terms of position and direction, certain common expressions may be cautiously used in anatomical descriptions: front, back, in front of, behind, forward, backward, upper, lower, above, below, upward, downward, ascending, descending. These terms are free of ambiguity only if they are used in reference to the anatomical position. A number of other common terms, such as "under," however, are generally best avoided. In this work we will use technical terms of position and direction.

History of anatomy

Anatomy can be traced from the Greek period, B.C., and the Roman Empire, A.D., to Andreas Vesalius, who reformed the subject in his De humani corporis fabrica ("On the Workings of the Human Body") in 1543. Subsequent highlights include the discovery of the compound microscope (1590), the founding of microscopic anatomy by Malpighi (seventeenth century), the discovery of the circulation of the blood by Harvey (1628), the establishment of modern embryology by Wolff (eighteenth century), the gross classification of tissues by Bichat (1801), and many notable advances during the nineteenth and twentieth centuries.

The best general introduction to the history of anatomy is Singer, C., A Short History of Anatomy and Physiology from the Greeks to Harvey, Dover, New York, 1957. Two other interesting works are Saunders, J. B. de C. M., and O'Malley, C. D., The Illustrations from the Works of Andreas Vesalius of Brussels, World Publishing Co., Cleveland, 1950; and O'Malley, C. D., and Saunders, J. B. de C. M., Leonardo da Vinci on the Human Body, Schuman, New York, 1952.

Anatomical literature

In addition to journals (such as Acta Anatomica, American Journal of Anatomy, Anatomy and Embryology, the Journal of Anatomy and Clinical Anatomy), many detailed books are available. Some useful works are cited below.

Systemic anatomy

Quain's Elements of Anatomy, 11th ed., Longmans, Green, London, 1908-1929, several volumes. The most detailed account in English.

Regional anatomy

Gardner, E., Gray, D. J., and O'Rahilly, R., Anatomy: A Regional Study of Human Structure, 4th ed., W. B. Saunders Company, Philadelphia, 1975. Provides more detail than this book and includes extensive references to the literature.

Von Lanz, T., and Wachsmuth, W., Praktische Anatomie, Springer, Berlin, 1935-1979, several volumes. Contains superb illustrations.

Applied anatomy

Abrahams, P., and Webb, P., Clinical Anatomy of Practical Procedures, Pitman, Tunbridge Wells, 1975.

Lachman, E., and Faulkner, K. K., Case Studies in Anatomy, 3rd ed., Oxford University Press, New York, 1981.

Schneider, L. K., Anatomical Case Histories, Year Book, Chicago, 1976.

Surface and radiological anatomy

Hamilton, W. J., Simon, G., and Hamilton, S. G. I., Surface and Radiological Anatomy, 5th ed., Heffer, Cambridge, 1971.

Systemic atlases

Sobotta, J., Atlas of Human Anatomy, and Spalteholz, W., Atlas of Human Anatomy, various editions and publishers. Two well-known examples.

Regional atlases

Bassett, D. L., A Stereoscopic Atlas of Human Anatomy, Sawyer's, Portland, Oregon, 1952-1962. Superb color transparencies.

Bo, W. J., Meschan, I., and Krueger, W. A., Basic Atlas of Cross-sectional Anatomy, W. B. Saunders Company, Philadelphia, 1980. Photographs and radiograms of anatomical sections. Other important crosssectional atlases are those by Eycleshymer and Schoemaker (1911) and by Symington (1917).

Grant's Atlas of Anatomy, 7th ed., ed. by J. E. Anderson, Williams & Wilkins, Baltimore, 1978. An excellent, annotated atlas.

Jamieson's Illustrations of Regional Anatomy, 9th ed., rev. by R. Walmsley and T. R. Murphy, Churchill Livingstone, Edinburgh, 1971-1972, several volumes. Simple blackboard drawings.

McMinn, R. M. H., and Hutchings, R. T., A Colour Atlas of Human Anatomy, Wolfe, London, 1976 (distributed in the United States by Year Book, Chicago). Excellent color photographs.

Questions

1-1 Which type of plane would include the entire length of the vertebral column?

1-2 Which types of planes would pass through both shoulder joints?

1-3 Which type of plane is transverse to (a) the little finger, (b) the big toe, and (c) the neck?

1-4 How is the thigh moved into a position of flexion, abduction, and lateral rotation?

1-5 Which is the most important book ever written on anatomy and when was it published?

1-6 Was the circulation of the blood appreciated at the time of Vesalius?

