THIRD EDITION

CASE FILES®: Anatomy

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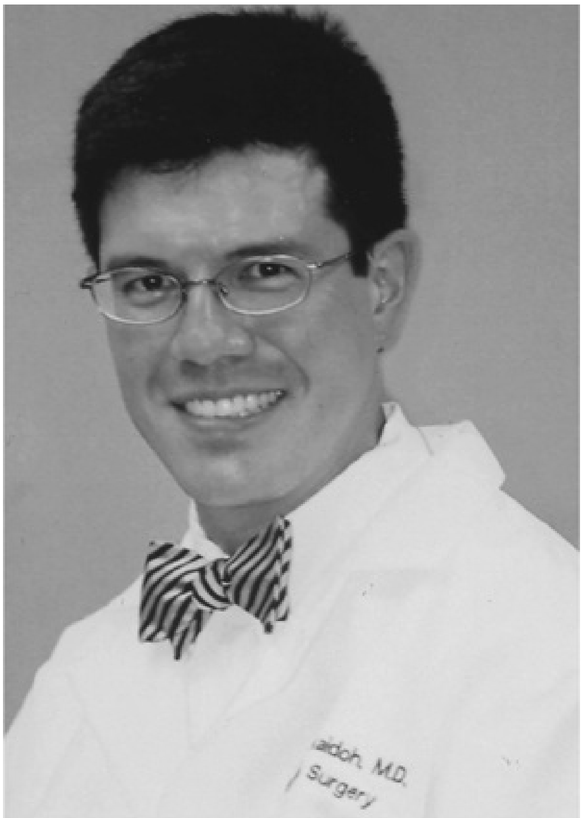
DEDICATION

Hitoshi “Toshi” Nikaidoh (1968–2003)



We dedicate this book to our dear friend, Dr. Toshi Nikaidoh, who led by example, always beyond th call of duty, and along the way, taught so many of us about so many important things about life.

As a surgeon-to-be, he tutored fellow lower-level medical students on not only how to master the challenges of gross anatomy but also how to develop the skillful art of dissection and respect for the human body.

As a spiritual leader, he taught his youth group not only the meaning of good fellowship by recalling good times spent on missionary travels abroad, but also the value of good worship by sharing his fait along the way.

As a physician, he taught patients not only to hope when all hope is lost but also to have faith throug which peace can be found.

And as a friend, son, brother, or just that smiling doctor in the hallway with the bow tie, he taught us how truly possible it is for one person to make a world of difference.

Toshi’s dedication to academics and education, his compassion for the sick and less fortunate, and hi tireless devotion to his faith, family, and friends have all continued to touch and change lives of all who knew him, and even of all who only knew of him.

Miki Takase, M
Fellow classma
University of Texas Medical School at Housto
St. Joseph Medical Center Ob/Gyn Reside
Written on behalf of Toshi's many frienc
classmates, fellow residents, staff, and faculty
University of Texas Medical School at Houston ar
St. Joseph Medical Cent

In the memory of Dr. Hitoshi Nikaidoh, who demonstrated unselfishness, love for his fellow man, anc compassion for everyone around him. He is the best example of the physician healer, and we were blessed to have known him.

—ECT

To my wife, Irene; the children, Chip, Jennifer, Jocelyn, Tricia, and Trey; and the medical students, each of whom has taught me something of value.

—LMR

To my students and colleagues, who bring joy and advancement to the teaching of anatomy; and to m family for their endless support.

—HZ

To my parents Kiriaki and Alexander, and my wife Beth, for their support, love, and encouragement

—CP

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PREFAC

We appreciate all the kind remarks and suggestions from the many medical students over the past 5 years. Your positive reception has been an incredible encouragement, especially in light of the short life of the *Case Files*® series. In this third edition of *Case Files*®: *Anatomy*, the basic format of the book has been retained. Improvements were made in updating many of the chapters. New cases include hydrocephalus, knee injury, peritoneal irritation, rotator cuff injury, and thoracic outlet syndrome. We reviewed the clinical scenarios with the intent of improving them; however, their “rea life” presentations patterned after actual clinical experience were accurate and instructive. The multiple-choice questions have been carefully reviewed and rewritten to ensure that they comply wit the National Board and United States Medical Licensing Examination (USMLE) format. Through thi third edition, we hope that the reader will continue to enjoy learning diagnosis and management through the simulated clinical cases. It certainly is a privilege to be teachers for so many students, an it is with humility that we present this edition.

The Autho

ACKNOWLEDGMENT

The inspiration for this basic science series occurred at an educational retreat led by Dr. Maximillian Buja, who at the time was the dean of the medical school. Dr. Buja served as Dean of the University o Texas Medical School at Houston from 1995 to 2003 before being appointed Executive Vice Presiden for Academic Affairs. It has been such a joy to work together with Dr. Lawrence Ross, who is a brilliant anatomist and teacher, and my new scientist author Dr. Han Zhang. Sitting side by side durin the writing process as they precisely described the anatomical structures was academically fulfilling, but more so, made me a better surgeon. It has been a privilege to work with Dr. Cristo Papasakelariou a dear friend, scientist, leader, and the finest gynecological laparoscopic surgeon I know. I would like to thank McGraw-Hill for believing in the concept of teaching by clinical cases. I owe a great debt to Catherine Johnson, who has been a fantastically encouraging and enthusiastic editor. It has been amazing to work together with my daughter Allison, who is a senior nursing student at the Scott and White School of Nursing; she is an astute manuscript reviewer and already early in her career she has a good clinical acumen and a clear writing style. Dr. Ross would like to acknowledge the figure drawings from the University of Texas Medical School at Houston originally published in Philo et al *Guide to Human Anatomy*, Philadelphia: Saunders, 1985. At Methodist Hospital, I appreciate and am grateful to Drs. Mark Boom, Alan Kaplan, and Judy Paukert. At St. Joseph Medical Center, I would like to recognize our outstanding administrators: Pat Mathews and Paula Efird. I appreciate Linda Bergstrom's advice and assistance. Without the help from my colleagues, Drs. Konrad Harms, Priti Schachel, Gizelle Brooks-Carter, John McBride, and Russell Edwards, this manuscript could not have been written. Most importantly, I am humbled by the love, affection, and encouragement from my lovely wife, Terri, and our children, Andy and his wife Anna, Michael, Allison, and Christina.

Eugene C. To

INTRODUCTION

Mastering the diverse knowledge within a field such as anatomy is a formidable task. It is even more difficult to draw on that knowledge, relate it to a clinical setting, and apply it to the context of the individual patient. To gain these skills, the student learns best with good anatomical models or a well dissected cadaver, at the laboratory bench, guided and instructed by experienced teachers, and inspire toward self-directed, diligent reading. Clearly, there is no replacement for education at the bench. Even with accurate knowledge of the basic science, the application of that knowledge is not always easy. Thus, this collection of patient cases is designed to simulate the clinical approach and stress the clinical relevance to the anatomical sciences.

Most importantly, the explanations for the cases emphasize the mechanisms and structure–functio principles rather than merely rote questions and answers. This book is organized for versatility to allow the student “in a rush” to go quickly through the scenarios and check the corresponding answer or to consider the thought-provoking explanations. The answers are arranged from simple to complex the bare answers, a clinical correlation of the case, an approach to the pertinent topic including objectives and definitions, a comprehension test at the end, anatomical pearls for emphasis, and a list of references for further reading. The clinical vignettes are listed by region to allow for a more synthetic approach to the material. A listing of cases is included in Section III to aid any students wh desire to test their knowledge of a certain area or to review a topic including basic definitions. We intentionally used open-ended questions in the case scenarios to encourage the student to think through relations and mechanisms.

SECTION I

Applying Basic Sciences to Clinical Situations

Part 1. Approach to Learning

Learning anatomy consists not only in memorization but also in visualization of the relations betwee the various structures of the body and understanding their corresponding functions. Rote memorization will quickly lead to forgetfulness and boredom. Instead, the student should approach a anatomical structure by trying to correlate its purpose with its design. Structures that are close together should be related not only spatially but also functionally. The student should also try to project clinical significance to the anatomical findings. For example, if two nerves travel close together down the arm, one could speculate that a tumor, laceration, or ischemic injury might affect both nerves; the next step would be to describe the deficits expected on physical examination.

The student must approach the subject in a systematic manner, by studying the **skeletal** relations o a certain region of the body, the **joints**, the **muscular system**, the **cardiovascular system** (including arterial perfusion and venous drainage), the **nervous system** (such as sensory and motor neural innervations), and the **skin**. Each bone or muscle is unique and has advantages due to its structure an limitions or perhaps vulnerability to specific injuries. The student is encouraged to read through the description of the anatomical relation in a certain region, correlate illustrations of the same structure and then try to envision the anatomy in three dimensions. For instance, if the anatomical drawings ar in the coronal plane, the student may want to draw the same region in the sagittal or cross-sectional plane as an exercise to visualize the anatomy more clearly.

Part 2. Basic Terminology

Anatomical position: The basis of all descriptions in the anatomical sciences, with the head, eyes, and toes pointing forward; the upper limbs by the side with the palms facing forward; and the lower limbs together.

Anatomical planes: A section through the body, one of four commonly described planes. The **media plane** is a single vertically oriented plane dividing the body into right and left halves, whereas the **sagittal planes** are oriented parallel to the median plane but not necessarily in the midline. **Coronal planes** are perpendicular to the median plane and divide the body into anterior (front) and posterior (back) portions. **Transverse, axial, or cross-sectional planes** pass through the body perpendicular to the median and coronal planes and divide the body into upper and lower parts.

Directionality: Superior (cranial) is toward the head, whereas **inferior (caudal)** is toward the feet; **medial** is toward the midline, whereas **lateral** is away from the midline. **Proximal** is toward the trun or attachment, whereas **distal** is away from the trunk or attachment. **Superficial** is near the surface, whereas **deep** is away from the surface.

Motion: Adduction is movement toward the midline, whereas **abduction** is movement away from th midline. **Extension** is straightening a part of the body, whereas **flexion** is bending the structure. **Pronation** is the action of rotating the palmar side of the forearm facing posteriorly, whereas **supination** is the action of rotating the palmar side of the forearm anteriorly.

Part 3. Approach to Reading

The student should **read with a purpose** and not merely to memorize facts. Reading with the goal of comprehending the relation between structure and function is one of the keys to understanding anatomy. Also, the ability to relate the anatomical sciences to the clinical picture is critical. The following seven key questions are helpful in ensuring the effective application of basic science information to the clinical setting.

1. **Given the importance of a certain required function, which anatomical structure provides th ability to perform that function?**
2. **Given the anatomical description of a body part, what is its function?**
3. **Given a patient's symptoms, what structure is affected?**
4. **Which lymph nodes are most likely to be affected by cancer at a particular location?**
5. **If an injury occurs to one part of the body, what is the expected clinical manifestation?**
6. **Given an anomaly such as weakness or numbness, what other symptoms or signs would the patient most likely have?**
7. **What is the male or female homologue to the organ in question?**

Let us consider these seven issues in further detail.

1. **Given the importance of a certain required function, which anatomical structure provides th ability to perform that function?**

   The student should be able to relate the anatomical structure to a function. When approaching the upper extremity, for instance, the student may begin with the statement, "The upper extremity must be able to move in many different directions to be able to reach up (flexion), reach backwar ~~(extension), reach to the side (abduction), bring the arm back (adduction), or turn a screwdr~~iver (pronation/supination).” Because the upper extremity must move in all these directions, the joint between the trunk and arm must be very versatile. Thus, the shoulder joint is a ball-and-socket joint to allow movement in the different directions required. Further, the shallower the socket is, the more mobility the joint has. However, the versatility of the joint makes its dislocation easier.

2. Given the anatomical description of a body part, what is its function?

This is the counterpart to the previous question regarding the relation between function and structure. The student should try to be imaginative and not merely accept the textbook (rote) information. One should be inquisitive, perceptive, and discriminating. For example, a student might speculate as to why bones contain marrow and are not completely solid and might theorize as follows: “The main purpose of bones is to support the body and protect various organs. If the bones were solid, they might be slightly stronger, but they would be much heavier and be a detriment to the body. Also, production of blood cells is a critical function of the body. Thus, by having the marrow within the center of the bone, the process is protected.”

3. Given a patient’s symptoms, what structure is affected?

This is one of the most critical questions of clinical anatomy. It is also one of the major question that a clinician must answer when evaluating a patient. In clinical problem solving, the physician elicits information by asking questions (taking the history) and performing a physical examinatio while making observations. The history is the single most important tool for making a diagnosis. A thorough understanding of the anatomy aids the clinician tremendously because most diseases affect body parts under the skin and require “seeing under the surface.” For example, a clinical observation might be: “a 45-year-old woman complains of numbness of the perineal area and has difficulty voiding.” The student might speculate as follows: “The sensory innervation of the perineal area is through sacral nerves S2 through S4, and control of the bladder is through the parasympathetic nerves, also S2 through S4. Therefore, two possibilities are a spinal cord proble involving those nerve roots or a peripheral nerve lesion. The internal pudendal nerve innervates the perineal region and is involved with micturition.” Further information is supplied: “The patient states that she has experienced back pain since a fall 2 weeks ago.” Now the lesion can be isolated to the spine, most likely the **cauda equina** (“horsetail”), which is a bundle of spinal nerv roots traversing through the cerebrospinal fluid.

4. Which lymph nodes are most likely to be affected by cancer at a particular location?

The lymphatic drainage of a particular region of the body is important because cancer may sprea through the lymphatics, and lymph node enlargement may result from infection. The clinician must be aware of these pathways to know where to look for metastasis (spread) of cancer. For example, if a cancer is located on the vulva labia majora (or the scrotum in the male), the most likely lymph node involved is a superficial inguinal node. The clinician would then be alert to palpating the inguinal region for lymph node enlargement, which would indicate an advanced stage of cancer and a worse prognosis.

5. If an injury occurs to one part of the body, what is the expected clinical manifestation?

If a laceration, tumor, trauma, or bullet causes injury to a specific area of the body, it is importan to know which crucial bones, muscles, joints, vessels, and nerves might be involved. Also, an experienced clinician is aware of particular vulnerabilities. For example, the thinnest part of the skull is located in the temporal region, and underneath this is the middle meningeal artery. Thus, ~~blow to the temple may be disastrous. A laceration to the middle meningeal artery would lea~~d to an epidural hematoma because this artery is located superficial to the dura and can cause cerebra damage.

6. **Given an anomaly such as weakness or numbness, what other symptoms or signs would the patient most likely have?**

   This requires a three-step process in analysis. The student must be able to (a) deduce the initial injury on the basis of clinical findings, (b) determine the probable site of injury, and (c) make an educated guess as to which other structures are in close proximity and, if injured, what the clinica manifestations would be. To develop skill in discerning these relationships, one can begin from a clinical finding, propose an anatomical deficit, propose a mechanism or location of the injury, identify another nerve or vessel or muscle in that location, propose the new clinical finding, and s on.

7. **What is the male or female homologue to the organ in question?**

   Knowledge of male–female homologous correlates is important in understanding the embryologi relations and, hence, the resultant anatomical relations because fewer structures need to be memorized, as homologous relations are easier to discern than are two separate structures. For example, the vascular supplies of homologous structures are usually similar. The ovarian arteries arise from the abdominal aorta below the renal arteries; likewise, the testicular arteries arise fron the abdominal aorta.

KEY POINTS

- The student should approach an anatomical structure by visualizing the structure and understanding its function.
- A standard anatomical position is used as a reference for anatomical planes and terminology of movement.
- There are seven key questions to consider in ensuring the effective application of basic science information to the clinical arena.

REFERENCE

Moore KL, Agur AMR, Dalley AF. *Clinically Oriented Anatomy*, 6th ed. Baltimore, MD: Lippincott Williams & Wilkins, 2010.

SECTION II

Clinical Cases

CASE 1

A 32-year-old woman delivered a large (4800-g) baby vaginally after a somewhat difficult labor. Her prenatal course was complicated by diabetes, which developed during pregnancy. At delivery, the infant's head emerged, but the shoulders were stuck behind the maternal symphysis pubis, requiring the obstetrician to execute maneuvers to release the infant's shoulders and complete the delivery. The infant was noted to have a good cry and pink color but was not moving its right arm.

- What is the most likely diagnosis?
- What is the most likely etiology for this condition?
- What is the likely anatomical mechanism for this disorder?

ANSWERS TO CASE 1:

Brachial Plexus Injury

Summary: A large (4800-g) infant of a diabetic mother is delivered after some difficulty and cannot move its right arm. There is shoulder dystocia (the infant's shoulders are stuck after delivery of the head).

- **Most likely diagnosis:** Brachial plexus injury, probably Erb palsy (Duchenne-Erb paralysis)
- **Most likely etiology for this condition:** Stretching of the upper brachial plexus during delivery
- **Likely anatomical mechanism for this disorder:** Stretching of nerve roots C5 and C6 by an abnormal increase in the angle between the neck and the shoulder

CLINICAL CORRELATION

During delivery, particularly of a large infant, shoulder dystocia may occur. In this situation, the feta head emerges, but the shoulders become wedged behind the maternal symphysis pubis. An obstetrician will use maneuvers such as flexion of the maternal hips against the maternal abdomen (McRobert maneuver) or fetal maneuvers such as pushing the fetal shoulders into an oblique positio

These actions are designed to allow delivery of the fetal shoulders without excessive traction on the fetal ~~neck. Despite such carefully executed maneuvers, infants may be born with stretch injuries~~ to th brachial plexus, resulting in nerve palsies. The most common of these is an upper brachial plexus stretch injury, in which nerve roots C5 and C6 are affected, resulting in weakness of the infant's arm. Such injuries usually resolve spontaneously.

APPROACH TO:

The Brachial Plexus

OBJECTIVES

1. Be able to describe the spinal cord segments, named terminal branches, and motor and sensory deficits of an **upper brachial plexus injury**
2. Be able to describe the mechanism, spinal cord segments, named terminal branches, and motor ar sensory deficits of a **lower brachial plexus injury**
3. Be able to describe the mechanism, spinal cord segments, named terminal branches, and motor ar sensory deficits with **cord injury** of the brachial plexus

DEFINITIONS

BRACHIAL PLEXUS: A major peripheral nerve network formed by the anterior primary rami of th fifth cervical to the first thoracic spinal nerves

UPPER BRACHIAL PLEXUS INJURY: Typically involves nerve roots C5 and C6, resulting in the upper limb hanging at the side, with medial rotation and the palm facing posteriorly

LOWER BRACHIAL PLEXUS INJURY: Less common injury involving C8 through T1 and the ulnar nerve, leading to interosseous muscle atrophy and claw hand

SHOULDER DYSTOCIA: Condition whereby the fetal head delivers vaginally but the shoulders are impacted behind the maternal bony pelvis

DISCUSSION

The **brachial plexus** arises from the inferior portion of the cervical spinal cord enlargement. It is formed by the ventral **primary rami of spinal nerves C5 through C8** and most of **T1**. The network o nerves that form the brachial plexus is divided anatomically from proximal (medial) to distal (lateral into **roots, trunks, divisions, cords,** and **terminal branches** (mnemonic: **"Randy Travis drinks col Texas beer"**). The roots of the plexus emerge from between the anterior and middle scalene muscles together with the subclavian artery. Arising from the roots are branches to the **longus colli** and **scalene muscles** and the **dorsal scapular** and **long thoracic nerves.** The roots unite to form **superior middle,** and **inferior trunks.** The **suprascapular nerve** and the nerve to the **subclavius muscle** arise from the **superior trunk.** Each trunk is divided into **anterior** and **posterior divisions,** which will innervate musculature of the anterior and posterior compartments, respectively (Figure 1-1).

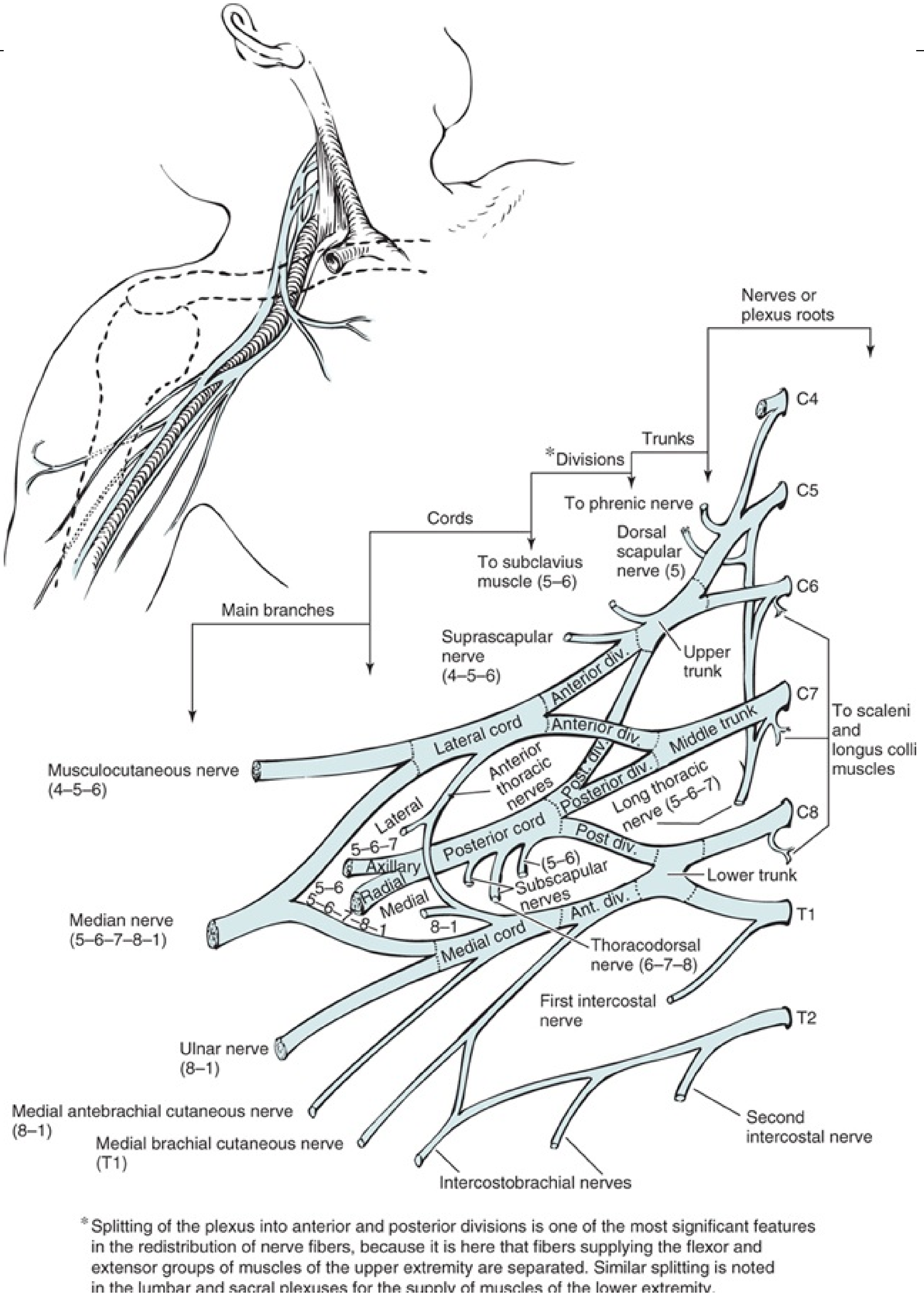

Figure 1-1. The brachial plexus. (*Reproduced, with permission, from Waxman SG. Clinical Neuroanatomy, 25th ed. New York: McGraw-Hill, 2003:348.*)

The anterior divisions of the superior and middle trunks unite to form the **lateral cord,** which branches off to the **lateral pectoral nerve.** The anterior division of the inferior trunk continues distally as the medial cord, whose branches are the **medial pectoral, medial brachial cutaneous,** an **medial antebrachial cutaneous nerves.** The posterior divisions of all three trunks unite to form the

posterior cord, and its branches are the **upper** and **lower subscapular** and **thoracodorsal nerves.** The ~~three cords are named according to their relation to the **axillary artery,** which passes throug~~h the plexus at this level. The terminal branches of the brachial plexus are the **axillary, musculocutaneous, median, ulnar,** and **radial nerves.**

The **axillary nerve (C5** and **C6)** arises from the **posterior cord** and courses posteriorly around the **surgical neck of the humerus,** where it is at risk for injury. The **posterior circumflex humeral artery** accompanies the nerve in this course. The axillary nerve supplies the **deltoid** and **teres minor muscles,** is sensory to the skin over the lower portion of the deltoid, and is optimally tested on the "shoulder patch" portion of the upper arm. **Axillary nerve injury,** such as that due to fracture at the **surgical neck of the humerus,** results in an **inability to abduct the arm at the shoulder to a horizontal position** and in **sensory loss in the shoulder patch area** (Figure 1-2).

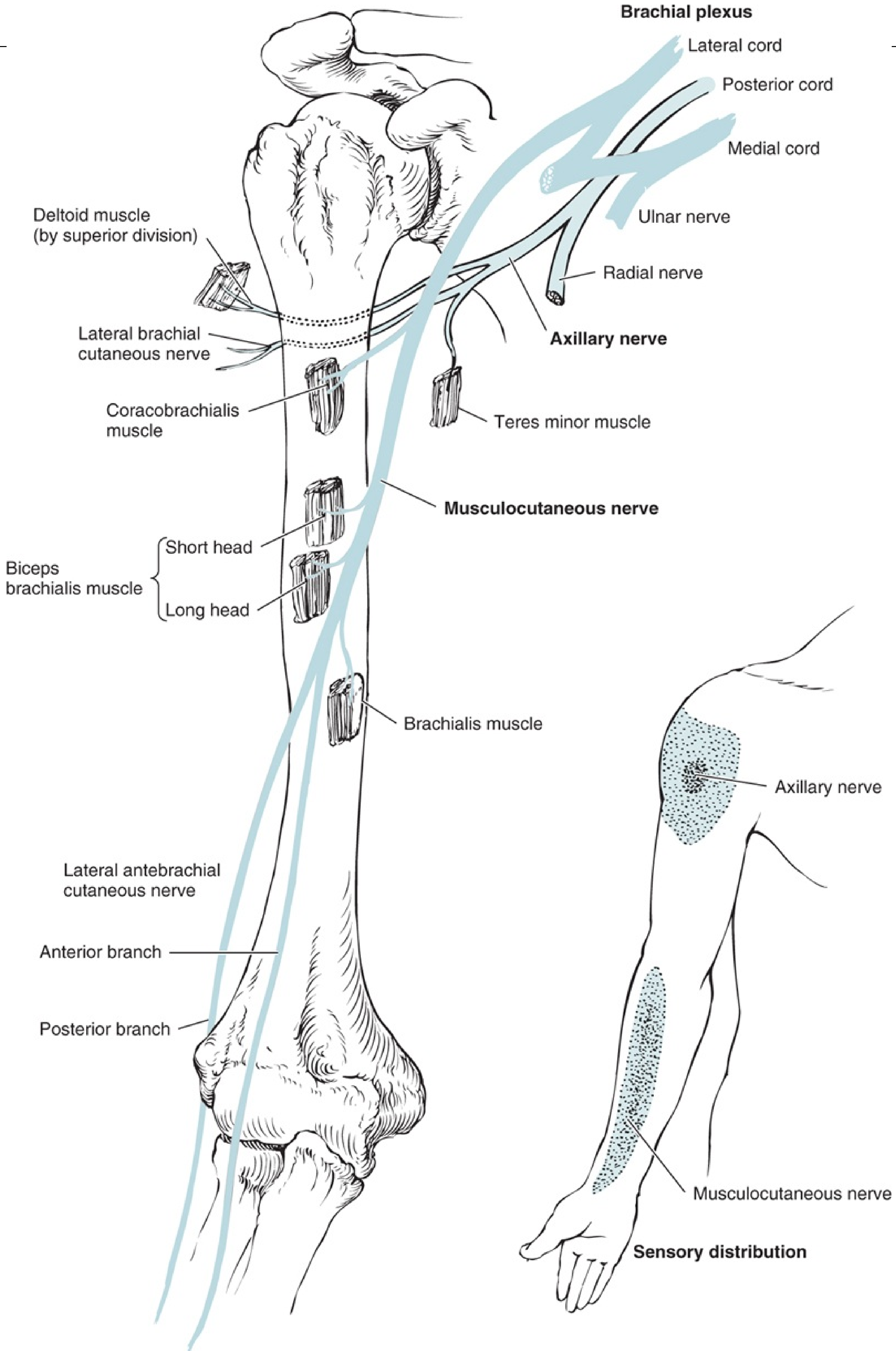
Brachial plexus
Lateral cord
Posterior cord
Medial cord
Ulnar nerve
Radial nerve
Axillary nerve
Deltoid muscle
(by superior division)
Lateral brachial
cutaneous nerve
Coracobrachialis
muscle
Teres minor muscle
Musculocutaneous nerve
Short head
Biceps
brachialis muscle
Long head
Brachialis muscle
Lateral antebrachial
cutaneous nerve
Anterior branch
Posterior branch
Axillary nerve
Musculocutaneous nerve
Sensory distribution

Figure 1-2. The musculocutaneous nerves (C5 and C6) and axillary nerves (C5 and C6). (*Reproducec with permission, from Waxman SG. Clinical neuroanatomy, 25th ed. New York: McGraw-Hill, 2003:350*.)

The **musculocutaneous nerve (C5–C7)** is the continuation of the lateral cord. It courses distally through the coracobrachialis muscle to innervate it in addition to the biceps brachii and brachialis muscles. The lateral antebrachial cutaneous nerve to the skin of the lateral forearm represents the terminal continuation of this nerve. Damage to the **musculocutaneous nerve** causes **weakness in supination and flexion of the shoulder and elbow.**

The upper portion of the brachial plexus arises from spinal cord segments C5 and C6; forms the **superior trunk;** and makes major contributions to the **axillary, musculocutaneous, lateral pectora** and **suprascapular nerves** and the **nerve to the subclavius muscle.** Injury to the upper plexus typically occurs with an increase in the angle between the shoulder and the neck. This can occur in a newborn during an obstetrical delivery or in adults as the result of a fall on the shoulder and side of the head and neck, which produces a widened angle. The resultant muscle paralysis due to such an injury may be understood more easily in an adult with such an injury. The upper extremity hangs lim by the side because the **deltoid and supraspinatus** (abductors of the arm) are paralyzed as a result o injury of the **axillary** and **suprascapular nerves,** respectively. In addition, the anterior deltoid, bicep brachii, and coracobrachialis (flexors of the arm) are paralyzed due to injury of the **axillary** and **musculocutaneous nerves.** The elbow is extended and the hand is pronated because of paralysis of tl **biceps brachii** and **brachialis muscles,** both of which are innervated by the **musculocutaneous nerve.** The extremity is medially rotated because of paralysis of the teres minor and infraspinatus muscles (lateral rotators of the arm) and injury to the axillary and suprascapular nerves. The palm of the hand is turned posteriorly in the "waiter's tip" sign. There is loss of sensation along the lateral aspect of the upper extremity, which corresponds to the **dermatome at C5 and C6**. The upper brachi plexus injury is known as **Erb's** or **Duchenne-Erb palsy**.

The **ulnar nerve (C8 and T1)** is a continuation of the **medial cord,** which enters the posterior compartment through the medial intermuscular septum and passes distally to enter the forearm by curving posteriorly to the **medial epicondyle.** Here it is superficial and at risk for injury. It enters the anterior compartment of the forearm, where it innervates the **flexor carpi ulnaris** and the **bellies of the flexor digitorum profundus** to the **ring and little fingers.** The **ulnar nerve** enters the hand through a **canal (Guyon canal) superficial to the flexor retinaculum.** The nerve supplies all the **intrinsic muscles** of the hand except for the **three thenar muscles** and the **lumbricals** of the **index and middle fingers.** It is sensory to the **medial border of the hand,** the **little finger,** and the **medial aspect of the ring finger.** Damage to the ulnar nerve in the upper forearm causes lateral (radial) deviation of the hand, with weakness in flexion and adduction of the hand at the wrist and loss of flexion at the distal interphalangeal joint of the ring and little fingers. Damage to the ulnar nerve in the upper forearm or at the wrist also results in loss of abduction and adduction of the index, middle, ring, and little fingers due to paralysis of the interossei muscles. **A** "claw hand" deformity results, an with longstanding damage, **atrophy of the interosseous muscles** occurs.

Injury to the **lower brachial plexus,** known as **Klumpke palsy,** occurs by a similar mechanism, that is, an abnormal widening of the angle between the upper extremity and the thorax. This may occ at obstetrical delivery by traction on the fetal head or when an individual reaches out to interrupt a fall. The roots from **C8 and T1** and/or the inferior trunk are stretched or torn. Spinal cord segments **C8 and T1** form the **ulnar nerve** and a significant portion of the **median nerve.** Most of the **muscle of the anterior forearm** are **innervated by the median nerve** (see Case 4) and will display weaknes

Most of the **muscles of the hand** are innervated by the **ulnar nerve**. There will be loss of sensation ~~along the **median aspect of the arm, forearm, hypothenar eminence,** and **little finger (C8 and T1**~~ **dermatome).**

Compression of the brachial plexus cords may occur with prolonged **hyperabduction** during performance of overhead tasks. The **hyperabduction syndrome of pain** down the arm, **paresthesia**, **hand weakness,** and **skin redness** may result from compression of the cords between the **coracoid process and pectoralis minor**. An **axillary-type crutch** that is too long can compress the posterior cord, leading to radial nerve palsy.

COMPREHENSION QUESTIONS

1.1 A 12-year-old boy is diagnosed with an upper brachial plexus injury after falling from a tree. He presents with his right upper arm lying limp at his side because of loss of abduction. Which of th following muscles are primarily responsible for abduction of the arm at the shoulder?

A. Deltoid and biceps brachii

B. Deltoid and supraspinatus

C. Deltoid and infraspinatus

D. Supraspinatus and infraspinatus

E. Coracobrachialis and supraspinatus

1.2 Injury to the lateral cord of the brachial plexus will also injure its continuation, the musculocutaneous nerve. Which of the following findings would you observe in a patient with this injury?

A. Weakness of abduction of the arm at the shoulder

B. Weakness of adduction of the arm at the shoulder

C. Weakness of extension of the forearm at the elbow

D. Weakness of flexion of the forearm at the elbow

E. Weakness of supination of the forearm and hand

1.3 A 22-year-old man is brought into the emergency department with a knife injury to the axilla. Th physician suspects injury to the lower brachial plexus. Which of the following nerves will most likely be affected?

A. Axillary

B. Musculocutaneous

C. Vagus

D. Radial

E. Ulnar

ANSWERS