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FIFTH EDITION

CASE FILES®
Surgery

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DEDICATION

To my dear parents Chuck and Grace who taught me the importance of pursuing excellence and instilled in me a love for books; to my sister Nancy for her compassion and unselfishness, her husband Jason and their beautiful daughters Madison and Peyton; and to my brother Glen for his friendship and our fond memories growing up, his wife Linda, and their precious son Eric.

—ECT

To my wife Eileen for her love, friendship, support, and encouragement. To my parents George and Jackie for their constant loving support, and to my sons Andrew and Gabriel who show to me the importance of family values, every day. To all my teachers and mentors, who took the time and effort to teach and serve as role models.

—THL

I would like to dedicate this book to my lovely wife, Gillian, and our son, Andre Jr., who have allowed me to pursue my life's work and supported me my entire career as a trauma surgeon and educator.

—ARC

To the residents and students who continue to challenge and push the frontiers of medicine. And to my wife, Samantha, and daughter, Mieko, who have rekindled my appreciation for everything that is wonderful in life.

—BJAP

To the wonderful medical students of the McGovern Medical School at The University of Texas Health Science Center at Houston (UTHealth) for whom this curriculum was developed.

—THE AUTHORS

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PREFACE

We appreciate all the kind remarks and suggestions from the many medical students over the past four years. Your positive reception has been an incredible encouragement, especially in light of the short life of the Case Files®series. In this fifth edition of Case Files® Surgery, the basic format of the book has been retained. Improvements were made by updating many of the chapters, with five completely rewritten cases: Breast Cancer Risk and Surveillance, Colon Cancer, Thyroid Mass, Pheochromocytoma, and Hemorrhage and Hypotension. We reviewed the clinical scenarios with the intent on improving them; however, we found that their real-life presentations patterned after actual clinical experience remained accurate and instructive. The multiple-choice questions have been carefully reviewed and rewritten to ensure that they comply with the National Board and USMLE formats. By reading this fifth edition, we hope that you will continue to enjoy learning surgical management through the simulated clinical cases. It is certainly a privilege to be a teacher for so many students, and it is with humility that we present this edition.

*T*he Authors

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ACKNOWLEDGMENTS

The curriculum that evolved into the ideas for this series was inspired by two talented and forthright students, Philbert Yao and Chuck Rosipal, who have since graduated from medical school. It has been a tremendous joy to work with my friend since medical school, Terry Liu, a brilliant surgeon. It has been rewarding to collaborate once again with Andre Campbell, who has deservedly advanced to have many educational and clinical leadership roles at the University of California, San Francisco. It has been a pleasure to have Barnard Palmer, a very astute surgeon and educator, to join our team. We also thank our excellent contributors. I am greatly indebted to my editor, Catherine Johnson, whose exuberance, experience, and vision helped to shape this series. I appreciate McGraw-Hill's believing in the concept of teaching through clinical cases. I am also grateful to Catherine Saggese for her excellent production expertise and Cindy Yoo for her wonderful editing. Hardik Popli deserves acknowledgement for his amazing patience and precision as project manager for this book. At McGovern Medical School, I appreciate the great support from Drs. Sean Blackwell, Patricia Butler, and John Riggs, without whom I would not have been able to complete this book. Most of all, I appreciate my loving wife, Terri, and my four wonderful children, Andy and his wife Anna, Michael, Allison, and Christina, for their patience, encouragement, and understanding.

Eugene C. *T*oy

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INTRODUCTION

Mastering the cognitive knowledge within a field such as general surgery is a formidable task. It is even more difficult to draw on that knowledge, procure and filter through the clinical and laboratory data, develop a differential diagnosis, and finally form a rational treatment plan. To gain these skills, the student often learns best at the bedside, guided and instructed by experienced teachers and inspired toward self-directed, diligent reading. Clearly, there is no replacement for education at the bedside. Unfortunately, clinical situations usually do not encompass the breadth of the specialty. Perhaps the best alternative is a carefully crafted patient case designed to stimulate the clinical approach and decision making. In an attempt to achieve this goal, we have constructed a collection of clinical vignettes to teach diagnostic or therapeutic approaches relevant to general surgery. Most importantly, the explanations for the cases emphasize the mechanisms and underlying 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 answers, and to provide more detailed information for the student who wants thought-provoking explanations. The answers are arranged from simple to complex: a summary of the pertinent points, the bare answers, an analysis of the case, an approach to the topic, a comprehension test at the end for reinforcement and emphasis, and a list of resources for further reading. The clinical vignettes are purposely arranged randomly in order to simulate the way that real patients present to the practitioner. A listing of cases is included in Section III to aid the student who desires to test his or her knowledge of a certain area or to review a topic, including basic definitions. Finally, we intentionally did not primarily use a multiple-choice question format because clues (or distractions) are not available in the real world. Nevertheless, several multiple-choice questions are included at the end of each scenario to reinforce concepts or introduce related topics.

HOW TO GET THE MOST OUT OF THIS BOOK

Each case is designed to simulate a patient encounter and includes open-ended questions. At times, the patient's complaint differs from the issue of most concern, and sometimes extraneous information is given. The answers are organized into four different parts:

PART I

1. Summary: The salient aspects of the case are identified, filtering out the extraneous information. The student should formulate his or her summary from the case before looking at the answers. A comparison with the summation in the answer help to improve one's ability to focus on the important data while appropriately discarding irrelevant information, a fundamental skill required in clinical problem solving.

2. A straightforward answer is given to each open-ended question.
3. An analysis of the case, which consists of two parts:
   a. Objectives: A listing of the two or three main principles, which are crucial for a practitioner in treating a patient. Again, the student is challenged to make educated "guesses" about the objectives of the case after an initial review of the case scenario, which help to sharpen his or her clinical and analytical skills.
   b. Considerations: A discussion of the relevant points and a brief approach to a specific patient.

PART II

An approach to the disease process, consisting of two distinct parts:

a. Definitions: Terminology pertinent to the disease process
b. Clinical Approach: A discussion of the approach to the clinical problem in general, including tables, figures, and algorithms.

PART III

Comprehension Questions: Each case includes several multiple-choice questions, which reinforce the material or introduce new and related concepts. Questions about material not found in the text are explained in the answers.

PART IV

Clinical Pearls: A listing of several clinically important points, which are reiterated as a summation of the text and to allow for easy review, such as before an examination.

LISTING BY CASE NUMBER

LISTING BY DISORDER (ALPHABETICAL)

SECTION I

How to Approach Clinical Problems

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Part 1. Approach to the Patient

The transition from textbook or journal article learning to an application of the information in a specific clinical situation is one of the most challenging tasks in medicine. It requires retention of information, organization of the facts, and recall of myriad data with precise application to the patient. The purpose of this text is to facilitate this process. The first step is gathering information, also known as establishing the database. This includes recording the patient's history; performing the physical examination; and obtaining selective laboratory examinations, special evaluations such as breast ductograms, and/or imaging tests. Of these, the historical examination is the most important and most useful. Sensitivity and respect should always be exercised during the interview of patients.

CLINICAL PEARL

» The history is usually the single most important tool in reaching a diagnosis. The art of obtaining this information in a nonjudgmental, sensitive, and thorough manner cannot be overemphasized.

HISTORY

1. **Basic information:**
   a. **Age:** Must be recorded because some conditions are more common at certain ages; for instance, age is one of the most important risk factors for the development of breast cancer.
   b. **Gender:** Some disorders are more common in or found exclusively in men such as prostatic hypertrophy and cancer. In contrast, women more commonly have autoimmune problems such as immune thrombocytopenia purpura and thyroid nodules. Also, the possibility of pregnancy must be considered in any woman of childbearing age.
   c. **Ethnicity:** Some disease processes are more common in certain ethnic groups (such as diabetes mellitus in the Hispanic population).

CLINICAL PEARL

» The possibility of pregnancy must be entertained in any woman of childbearing age.

2. **Chief complaint:** What is it that brought the patient into the hospital or office? Is it a scheduled appointment or an unexpected symptom such as abdominal pain or hematemesis? The duration and character of the complaint, associated symptoms, and exacerbating and/or relieving factors should be recorded. The chief complaint engenders a differential diagnosis, and the possible etiologies should be explored by further inquiry.

CLINICAL PEARL

» The first line of any surgical presentation should include **age, ethnicity, gender,** and **chief complaint.** Example: A 32-year-old Caucasian man complains of lower abdominal pain over an 8-hour duration.

3. **Past medical history:**
   a. Major illnesses such as hypertension, diabetes, reactive airway disease, congestive heart failure, and angina should be detailed.
      i. Age of onset, severity, end-organ involvement.
      ii. Medications taken for a particular illness, including any recent change in medications and the reason for the change.
      iii. Last evaluation of the condition. (eg, When was the last echocardiogram performed in a patient with congestive heart failure?)
      iv. Which physician or clinic is following the patient for the disorder?
   b. Minor illnesses such as a recent upper respiratory tract infection may impact on the scheduling of elective surgery.
   c. Hospitalizations no matter how trivial should be detailed.
4. **Past surgical history:** Date , types, indications, and outcomes of procedures should be elicited. Laparoscopy versus laparotomy should be distinguished. Surgeon, hospital name, and location should be listed. This information should be correlated with the surgical scars on the patient's body. Any complications should be delineated, including anesthetic complications, difficult intubations, and so on.
5. **Allergies:** Reactions to medications should be recorded, including severity and temporal relationship to administration of medication. Immediate hypersensitivity should be distinguished from an adverse reaction.
6. **Medications:** A list of medications including dosage, route of administration and frequency, and duration of use should be developed. Prescription, over-the-counter, and herbal remedies are all relevant.
7. **Social history:** Marital status; family support; alcohol use, use or abuse of illicit drugs, and tobacco use; and tendencies toward depression or anxiety are important.
8. **Family history:** Major medical problems, genetically transmitted disorders such as breast cancer, and important reactions to anesthetic medications such as malignant hyperthermia (an autosomal dominant transmitted disorder) should be explored.
9. **Review of systems:** A system review should be performed focusing on the more common diseases. For example, in a young man with a testicular mass, trauma to the area, weight loss, neck masses, and lymphadenopathy are important. In an elderly woman, symptoms suggestive of cardiac disease should be elicited, such as chest pain, shortness of breath, fatigue, weaknesses, and palpitations.

CLINICAL PEARL

» Malignant hyperthermia is a rare condition inherited in an autosomal dominant fashion. It is associated with a rapid rise in temperature up to 40.6°C (105°F), usually on induction by general anesthetic agents such as succinylcholine and halogenated inhalant gases. Prevention is the best treatment.

PHYSICAL EXAMINATION

1. **General appearance:** Note whether the patient is cachectic versus well nourished, anxious versus calm, alert versus obtunded.
2. **Vital signs:** Record the temperature, blood pressure, heart rate, and respiratory rate. Height and weight are often included here. For trauma patients, the Glasgow Coma Scale (GCS) is important.
3. H**ead and neck examination:** Evidence of trauma, tumors, facial edema, goiter and thyroid nodules, and carotid bruits should be sought. With a closed-head injury, pupillary reflexes and unequal pupil sizes are important. Cervical and supraclavicular nodes should be palpated.
4. B**reast examination:** Perform an inspection for symmetry and for skin or nipple retraction with the patient's hands on her hips (to accentuate the pectoral muscles) and with her arms raised. With the patient supine, the breasts should be palpated systematically to assess for masses. The nipples should be assessed for discharge, and the axillary and supraclavicular regions should be examined for adenopathy.
5. **Cardiac examination:** The point of maximal impulse should be ascertained, and the heart auscultated at the apex as well as at the base. Heart sounds, murmurs, and clicks should be characterized. Systolic flow murmurs are fairly common in pregnant women because of the increased cardiac output, but significant diastolic murmurs are unusual.
6. **Pulmonary examination:** The lung fields should be examined systematically and thoroughly. Wheezes, rales, rhonchi, and bronchial breath sounds should be recorded.
7. A**bdominal examination:** The abdomen should be inspected for scars, distension, masses or organomegaly (ie, spleen or liver), and discoloration. For instance, the Grey Turner sign of discoloration on the flank areas may indicate an intra-abdominal or retroperitoneal hemorrhage. Auscultation should be performed to identify normal versus high-pitched, and hyperactive versus hypoactive, bowel sounds. The abdomen should be percussed for the presence of shifting dullness (indicating ascites). Careful palpation should begin initially away from the area of pain, involving one hand on top of the other, to assess for masses, tenderness, and peritoneal signs. Tenderness should be recorded on

a scale (eg, 1-4, where 4 is the most severe pain). Guarding and whether it is voluntary or involuntary should be noted.

8. **Back and spine examination:** The back should be assessed for symmetry, tenderness, or masses. The flank regions are particularly important in assessing for pain on percussion that may indicate renal disease.

9. **Genital examination:**
   a. **Female:** The external genitalia should be inspected, and the speculum then used to visualize the cervix and vagina. A bimanual examination should attempt to elicit cervical motion tenderness, uterine size, and ovarian masses or tenderness.
   b. **Male:** The penis should be examined for hypospadias, lesions, and infection. The scrotum should be palpated for masses and, if present, transillumination should be used to distinguish between solid and cystic masses. The groin region should be carefully palpated for bulging (hernias) on rest and on provocation (coughing). This procedure should optimally be repeated with the patient in different positions.
   c. **Rectal examination:** A rectal examination can reveal masses in the posterior pelvis and may identify occult blood in the stool. In females, nodularity and tenderness in the uterosacral ligament may be signs of endometriosis. The posterior uterus and palpable masses in the cul-de-sac may be identified by rectal examination. In the male, the prostate gland should be palpated for tenderness, nodularity, and enlargement.

10. **Extremities and skin:** The presence of joint effusions, tenderness, skin edema, and cyanosis should be recorded.

11. N**eurologic examination:** Patients who present with neurologic complaints usually require thorough assessments, including evaluation of the cranial nerves, strength, sensation, and reflexes.

CLINICAL PEARL

» A thorough understanding of anatomy is important to optimally interpret the physical examination findings.

12. Laboratory assessment depends on the circumstances.
   a. **A complete blood count:** To assess for anemia, leukocytosis (infection), and thrombocytopenia.
   b. **Urine culture or urinalysis:** To assess for infection or hematuria when ureteral stones, renal carcinoma, or trauma is suspected.
   c. **Tumor markers:** For example, in testicular cancer, β-human chorionic gonadotropin, α-fetoprotein, and lactate dehydrogenase values are often elevated.

d. **Serum creatinine and serum urea nitrogen levels:** To assess renal function, and aspartate aminotransferase (AST) and alanine aminotransferase (ALT) values to assess liver function.

13. **Imaging procedures:**
    a. An ultrasound examination is the most commonly used imaging procedure to distinguish a pelvic process in female patients, such as pelvic inflammatory disease. It is also very useful in diagnosing gallstones and measuring the caliber of the common bile duct. It can also help discern solid versus cystic masses.
    b. Computed tomography (CT) is extremely useful in assessing fluid and abscess collections in the abdomen and pelvis. It can also help determine the size of lymph nodes in the retroperitoneal space.
    c. Magnetic resonance imaging identifies soft tissue planes and may assist in assessing prolapsed lumbar nucleus pulposus and various orthopedic injuries.
    d. Intravenous pyelography uses dye to assess the concentrating ability of the kidneys, the patency of the ureters, and the integrity of the bladder. It is also useful in detecting hydronephrosis, ureteral stones, and ureteral obstructions.

Part 2. Approach to Clinical Problem Solving

There are typically four distinct steps that a clinician takes to systematically solve most clinical problems:

1. Making the diagnosis
2. Assessing the severity or stage of the disease
3. Proposing a treatment based on the stage of the disease
4. Following the patient's response to the treatment

MAKING THE DIAGNOSIS

A diagnosis is made by a careful evaluation of the database, analyzing the information, assessing the risk factors, and developing the list of possibilities (the differential diagnosis). Experience and knowledge help the physician "key in" on the most important possibilities. A good clinician also knows how to ask the same question in several different ways and use different terminology. For example, a patient may deny having been treated for "cholelithiasis" but answer affirmatively when asked if he has been hospitalized for "gallstones." Reaching a diagnosis may be achieved by systematically reading about each possible cause and disease.

Usually a long list of possible diagnoses can be pared down to two or three that are the most likely, based on selective laboratory or imaging tests. For example, a patient who complains of upper abdominal pain and has a history of nonsteroidal anti-inflammatory drug use may have peptic ulcer disease; another patient who has abdominal pain, fatty food intolerance, and abdominal bloating may have

cholelithiasis. Yet another individual with a 1-day history of periumbilical pain localizing to the right lower quadrant may have acute appendicitis.

CLINICAL PEARL

» The first step in clinical problem solving is **making the diagnosis.**

ASSESSING THE SEVERITY OF THE DISEASE

After establishing the diagnosis, the next step is to characterize the severity of the disease process: in other words, describing "how bad" a disease is. With malignancy, this is done formally by staging the cancer. Most cancers are categorized from stage I (least severe) to stage IV (most severe). With some diseases, such as with head trauma, there is a formal scale (the GCS) based on the patient's eye-opening response, verbal response, and motor response.

CLINICAL PEARL

» The second step in clinical problem solving is to **establish the severity or stage of the disease.** There is usually prognostic or treatment significance based on the stage.

TREATING BASED ON THE STAGE

Many illnesses are stratified according to severity because the prognosis and treatment often vary based on the severity. If neither the prognosis nor the treatment were affected by the stage of the disease process, there would be no reason to subcategorize the illness as mild or severe. For example, obesity is subcategorized as moderate (body mass index [BMI] 35 to 40 kg/ m^2) or severe (BMI > 40 kg/ m^2), with different prognoses and recommended interventions. Surgical procedures for obesity such as gastric bypass are only generally considered when a patient has severe obesity and/ or significant comorbidities such as sleep apnea.

CLINICAL PEARL

» The third step in clinical problem solving is, in most cases, **tailoring the treatment** to the extent or stage of the disease.

FOLLOWING THE RESPONSE TO TREATMENT

The final step in the approach to disease is to follow the patient's response to the therapy. The "measure" of response should be recorded and monitored. Some responses are clinical, such as improvement (or lack of improvement) in a patient's

abdominal pain, temperature, or pulmonary examination. Other responses can be followed by imaging tests such as a CT scan to determine the size of a retroperitoneal mass in a patient receiving chemotherapy, or with a tumor marker such as the level of prostate-specific antigen in a male receiving chemotherapy for prostatic cancer. For a closed-head injury, the GCS is used. The student must be prepared to know what to do if the measured marker does not respond according to what is expected. Is the next step to treat again, to reassess the diagnosis, to pursue a metastatic workup, or to follow up with another more specific test?

CLINICAL PEARL

» **The fourth step in clinical problem solving is to monitor treatment response or efficacy,** which can be measured in different ways. It may be symptomatic (the patient feels better) or based on a physical examination (fever), a laboratory test (prostate-specific antigen level), or an imaging test (size of a retroperitoneal lymph node on a CT scan).

Part 3. Approach to Reading

The clinical problem-oriented approach to reading is different from the classic "systematic" research of a disease. A patient's presentation rarely provides a clear diagnosis; hence, the student must become skilled in applying textbook information to the clinical setting. Furthermore, one retains more information when one reads with a purpose. In other words, the student should read with the goal of answering specific questions. There are several fundamental questions that facilitate **clinical thinking:**

1. What is the most likely diagnosis?
2. How can you confirm the diagnosis?
3. What should be your next step?
4. What is the most likely mechanism for this disease process?
5. What are the risk factors for this disease process?
6. What are the complications associated with this disease process?
7. What is the best therapy?

CLINICAL PEARL

» Reading with the purpose of answering the seven fundamental clinical questions improves retention of information and facilitates the application of book knowledge to clinical knowledge.

WHAT IS THE MOST LIKELY DIAGNOSIS?

The method of establishing the diagnosis has been covered in the previous section. One way of attacking this problem is to develop standard approaches to common clinical problems. It is helpful to understand the most common causes of various presentations, such as "The most common cause of serosanguineous nipple discharge is an intraductal papilloma."

The clinical scenario might be "A 38-year-old woman is noted to have a 2-month history of spontaneous blood-tinged right nipple discharge. What is the most likely diagnosis?"

With no other information to go on, the student notes that this woman has a unilateral blood-tinged nipple discharge. Using the "most common cause" information, the student makes an educated guess that the patient has an **intraductal papilloma.** If instead the patient is found to have a discharge from more than one duct and a right-sided breast mass is palpated, it is noted: "The bloody discharge is expressed from multiple ducts. A 1.5-cm mass is palpated in the lower outer quadrant of the right breast."

Then the student uses the clinical pearl: "The most common cause of serosanguineous breast discharge in the presence of a breast mass is breast cancer."

CLINICAL PEARL

» The most common cause of serosanguineous unilateral breast discharge is intraductal papilloma, but **the main concern is breast cancer.** Thus, the first step in evaluating the patient's condition is careful palpation to determine the number of ducts involved, an examination to detect breast masses, and mammography. If more than one duct is involved or a breast mass is palpated, the most likely cause is breast cancer.

HOW CAN YOU CONFIRM THE DIAGNOSIS?

In the preceding scenario, it is suspected that the woman with the bloody nipple discharge has an intraductal papilloma, or possibly cancer. Ductal surgical exploration with biopsy would be a confirmatory procedure. Similarly, an individual may present with acute dyspnea following a radical prostatectomy for prostate cancer. The suspected process is pulmonary embolism, and a confirmatory test would be a ventilation/ perfusion scan or possibly a spiral CT examination. The student should strive to know the limitations of various diagnostic tests, especially when they are used early in a diagnostic process.

WHAT SHOULD BE YOUR NEXT STEP?

This question is difficult because the next step has many possibilities; the answer may be to obtain more diagnostic information, stage the illness, or introduce therapy. It is often a more challenging question than "What is the most likely diagnosis?" because there may be insufficient information to make a diagnosis and the next step may be to obtain more data. Another possibility is that there is enough

information for a probable diagnosis and that the next step is staging the disease. Finally, the most appropriate answer may be to begin treatment. Hence, based on the clinical data, a judgment needs to be rendered regarding how far along one is in the following sequence.

1. Make a diagnosis → 2. Stage the disease →
3. Treat based on stage → 4. Follow the response

Frequently, students are taught to "regurgitate" information that they have read about a particular disease but are not skilled at identifying the next step. This talent is learned optimally at the bedside in a supportive environment with the freedom to take educated guesses and receive constructive feedback. A sample scenario might describe a student's thought process as follows:
Make a diagnosis: "Based on the information I have, I believe that Mr Smith has a small bowel obstruction from adhesive disease because he presents with nausea, vomiting, and abdominal distension and has dilated loops of bowel on radiography."
Stage the disease: "I do not believe that this is severe disease because he does not have fever, evidence of sepsis, intractable pain, leukocytosis, or peritoneal signs."
Treat based on stage: "Therefore, my next step is to treat with nothing per mouth, nasogastric tube drainage, and observation."
Follow the response: "I want to follow the treatment by assessing his pain (asking him to rate the pain on a scale of 1-10 every day), recording his temperature, performing an abdominal examination, obtaining a serum bicarbonate level (to detect metabolic acidemia) and a leukocyte count, and reassessing his condition in 24 hours."

In a similar patient, when the clinical presentation is unclear, perhaps the best next step is a diagnostic one such as performing an oral contrast radiologic study to assess for bowel obstruction.

CLINICAL PEARL

» The vague question "What is your next step?" is often the most difficult one because the answer may be diagnostic, staging, or therapeutic.

WHAT IS THE LIKELY MECHANISM FOR THIS DISEASE PROCESS?

This question goes further than making the diagnosis and requires the student to understand the underlying mechanism of the process. For example, a clinical scenario may describe a 68-year-old man who notes urinary hesitancy and retention and has a large, hard, nontender mass in his left supraclavicular region. This patient has bladder neck obstruction due to benign prostatic hypertrophy or prostatic cancer. However, the indurated mass in the left neck area is suggestive of cancer. The mechanism is metastasis in the area of the thoracic duct, which drains lymph fluid into the left subclavian vein. The student is advised to learn the mechanisms of each disease process and not merely to memorize a constellation of symptoms. Furthermore, in general surgery it is crucial for students to understand the anatomy, function, and how a surgical procedure will correct the problem.