

# Anesthesia Student Survival Guide

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## A Case-Based Approach

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# Preface

This book was written by residents, fellows, and faculty who specialize in medical education and would like to share with you their excitement for the field of anesthesiology. Our goal in writing the *Anesthesia Student Survival Guide: A Case-Based Approach* was to provide a concise, easy to use, and up-to-date introduction to the practice of anesthesiology.

Any student of anesthesia will find this unique book useful – it covers both basic and advanced topics and includes case studies designed to help apply theoretical knowledge to real patient situations. In order to get the most out of the book we suggest you first read the case associated with each chapter, followed by the chapter, and then try to answer the questions in the case on your own *before* reading our sample answers found at the end of the chapter. This will help you focus your reading and retain as much of the key information as possible because each case will provide a context in which the material is presented. The case studies without answers can be downloaded at [extras.springer.com](http://extras.springer.com) and can also be found on pages xvii–xxxv of the book. A selection of the case studies with answers is also available at [extras.springer.com](http://extras.springer.com) as downloadable PDF files and can be used as educational handouts or for individual study.

As educators, we are indebted to generations of students at Harvard Medical School who inspired us to write this practical “survival” guide, and we are thankful for the support and expertise of our contributors at the Massachusetts General Hospital, Brigham and Women’s Hospital, and beyond.

We are especially indebted to a number of individuals whose unending support and encouragement made this work possible. These include Drs. Jeanine Wiener-Kronish, Charles Vacanti, and Warren Sandberg. We would also like to thank Dr. Joseph Garfield and Ms. Eva Cassedy for their outstanding editorial contributions, and Dr. Katharine Nicodemus for her tireless support, encouragement, and guidance. Finally, a special thanks to our parents and families.

As you discover the exciting world of anesthesiology, we hope that you find the *Anesthesia Student Survival Guide: A Case-Based Approach* an essential tool!

Jesse M. Ehrenfeld, MD, MPH  
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# Foreword

As anesthesiologists and Harvard Medical Student educators, we have met few people more dedicated to the art of teaching and the experience of learning than Drs. Ehrenfeld, Urman, and Segal. Now we have the privilege of introducing their exciting new textbook of anesthesiology written for medical students. *Anesthesia Student Survival Guide: A Case-Based Approach* is a wonderful synthesis of the broad scope and key concepts of anesthesiology. The book is presented in an easy format for a medical student to learn and absorb during the typically brief 1–4 week exposure to the specialty.

Students come to their anesthesia rotation with a basic science foundation, and little to no familiarity with the types of clinical challenges facing the anesthesiologist. They typically have even less exposure to the thinking and behaviors required to successfully meet those challenges. Drs. Ehrenfeld, Urman, and Segal have created a textbook which not only delivers concise and logical anesthesiology content, but demonstrates the connection between the student's basic knowledge of anatomy, physiology, pharmacology, and the clinical art and science of anesthesiology. The educational format enables students to move up the taxonomy of learning behaviors by helping them synthesize and apply what they learn to sample cases.

The book begins with a historic overview and introduction of the medical specialty of anesthesiology. In addition, the introduction instructs students on how to practically get the most out of their anesthesia rotation. The pharmacologic principles on intravenous and inhalational anesthetic agents, local anesthetics, muscle relaxants, and sedatives are presented in the next five chapters. The all important preoperative patient evaluation, airway evaluation and monitoring are covered in the following three chapters.

Pharmacology is then put together with the patient history and physiology to help the student understand the choice of anesthetic techniques, fluid management, common anesthetic problems, and subspecialty management. Postoperative PACU and ICU care with an emphasis on pain and organ system derangement are reviewed. Lastly, the book discusses the complex and contemporary topics of professionalism, teamwork, quality assurance, and ethics in anesthesia in a clear and forthright manner.

Drs. Ehrenfeld, Urman, and Segal clarify and solidify perioperative concepts with their use of case-based studies at the end of each chapter. The cases

are practical and help to contextualize anesthesia principles. As medical student educators, we know that case studies are indeed one of the best strategies to help students transition from the classroom to the clinical environment. These cases are illustrative, thought provoking, and a stimulus for further discussion that will help students gain the most from their exposure to anesthesia practice.

The topics are judiciously chosen and are widely applicable to patient care both within and out of the operating room. They will help all students develop the necessary skills to become better perioperative caregivers. This book is a valuable guide for all students, whether or not they become anesthesiologists, because they will come away with an appreciation of how anesthesiologists apply their understanding of human physiology and pharmacology to provide safe and effective medical care to patients.

Boston, MA

Michele Szabo, MD

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# CASE STUDIES

*In order to focus your reading and retain as much of the key information as possible, please read each of the following case studies immediately before beginning the corresponding chapter. The answers to the case studies are found at the end of each chapter.*

## Chapter 1 Case Study

You are preparing to provide general anesthesia for a 40 year-old woman undergoing an abdominal hysterectomy. She is otherwise healthy. She had two uncomplicated vaginal deliveries in the past, both with uncomplicated epidural labor analgesia. She had uneventful general anesthesia for a laparoscopic tubal ligation four years ago. Your attending is willing to let you perform as much of the anesthetic as you are able to describe in detail.

- *Upon meeting the patient in the preop area and reviewing the history and physical, you find no important new information. What steps will you take to prepare the patient for surgery prior to any interventions?*
- *You have engaged the patient and checked all the paperwork and you are ready to begin preparing the patient for surgery. What are the next steps?*
- *You have brought the patient into the OR. Describe the steps you will take prior to induction of anesthesia.*
- *How will you induce anesthesia?*
- *Following induction, what else will you do prior to the beginning of the surgical procedure?*
- *How will you maintain anesthesia?*
- *What other adjunctive drugs might you give in addition to anesthetics?*
- *The operation has gone well and is ending. How will you conclude the anesthetic?*
- *What will you do on arrival to the PACU?*

## Chapter 2 Case Study

The year is 1900 and you are a student spending time with surgeons during medical school. You are excited because you are to go to the operating room for the first time this morning. To your surprise, you will not be watching the procedure, open removal of a kidney stone, from afar, but instead will be taking an active role! The surgeon has asked you to administer the anesthesia. You are

told to bring the patient into the operating theater (where there are indeed stadium seats occupied by numerous observers of the famous attending surgeon). An orderly has shown you where the anesthetic supplies are kept.

- *Which anesthetics are you most likely to use?*
- *Which intravenous agents will you administer?*
- *How will you administer the anesthetic? How will you manage the airway?*
- *How will you monitor the patient?*
- *Will you keep an anesthetic record?*

### Chapter 3 Case Study

You are finished with a radical cystectomy with creation of an ileal pouch neobladder on an otherwise healthy, 80 kg, 60 year-old man with bladder cancer. The operation began six hours ago and the patient has not yet emerged from general anesthesia. You experienced no major untoward events during the case and you believe the problem to be pharmacologic. The patient received 4 mg of midazolam in divided doses during the preoperative period to facilitate placement of an arterial line. Anesthesia was induced with thiopental and succinylcholine. You maintained anesthesia with isoflurane, nitrous oxide, vecuronium, and fentanyl. Hydromorphone was given during the last hour of the case. You administered ondansetron during closure as antiemetic prophylaxis. You gave neostigmine and glycopyrrolate a few minutes ago. The isoflurane vaporizer is turned off and the patient is being ventilated with 100% oxygen.

- *Which classes of drugs are most likely to be responsible for his delayed emergence? Which are less likely?*
- *Among the most likely possible causes, do you suspect a pharmacokinetic problem? A pharmacodynamic problem?*
- *How could you narrow the differential diagnosis using history, physical examination, clinical monitors, or pharmacologic probes?*
- *If you conclude that isoflurane is responsible for the patient's delayed awakening, how will you proceed?*

### Chapter 4 Case Study

You are asked to provide general anesthesia for an otherwise healthy 30 year-old woman undergoing pelviscopy. She has a history of endometriosis and chronic pelvic pain. Her brother had a near-fatal episode of malignant hyperthermia as a child and she has been counseled to avoid triggering anesthetics. You decide to manage the case with total intravenous anesthesia, avoiding



inhalation anesthetics altogether. You have appropriately removed the vaporizers from your anesthesia machine and flushed it with 100% oxygen according to published recommendations.

- *Which classes of intravenous agents will you need?*
- *Which drug will use to produce and maintain unconsciousness? How will you know you've given enough? Will the dose needed change during the surgery?*
- *Which opioid would be most appropriate for intraoperative use? The case is booked for 2 hours. Will you change to a different agent for postoperative analgesia?*
- *Which neuromuscular blocking drug(s) will you choose, if any?*
- *At the end of the case, how will you conduct the emergence?*

## Chapter 5 Case Study

You are asked to induce anesthesia for an ENT procedure in which the surgeon wishes to inspect the airway during spontaneous respiration without the presence of an endotracheal tube or laryngeal mask airway. The patient is otherwise healthy and has a normal appearing airway, and you judge that maintaining the airway by mask will be successful. You agree to induce anesthesia by inhalation. The patient has an IV and standard monitors are in place.

- *Which inhalation agent will you choose?*
- *Would a combination of more than one inhaled agent offer any advantage?*
- *What are the factors you can control which will speed induction of anesthesia?*
- *You have an end-tidal gas monitor to measure exhaled agent. How will you know when you have the patient deeply anesthetized enough to allow the surgeon to perform laryngoscopy?*

## Chapter 6 Case Study

A 70 kg otherwise healthy male patient is undergoing bilateral inguinal herniorrhaphy under local anesthesia administered by the surgeon and intravenous sedation you are giving. The surgeon is planning to infiltrate the skin with lidocaine prior to skin incision.

- *The patient reports a history of an "allergic reaction" to Novocain (procaine) which she received during a dental procedure. Is it safe to administer the planned local anesthetics?*
- *The surgeon is planning to use 2% lidocaine with epinephrine for initial infiltration, followed by bupivacaine, 0.5% for longer lasting analgesia. How can she enhance the onset of the block?*

- *After infiltration with lidocaine, the surgeon is prepared to infiltrate further with bupivacaine and perform some deep nerve blocks to enhance analgesia. She asks you how much of a 0.5% solution she can safely use. How will you respond?*
- *The surgeon begins infiltration with bupivacaine. After about 15 mL have been injected, the patient complains of lightheadedness and then his eyes roll back and he loses consciousness. The patient develops tonic-clonic movements of his extremities. How will you respond?*
- *Despite your initial efforts, the patient remains unresponsive. The electrocardiogram shows ventricular tachycardia. You cannot palpate a pulse. How will you proceed?*

## Chapter 7 Case Study

You are asked to provide anesthesia for a woman undergoing needle-directed breast biopsy. She has had several past anesthetics and has not had good experiences. She explains that she has had severe nausea after all her general anesthetics, and that she has been very somnolent after general anesthesia as well as after monitored anesthesia care (local anesthetic plus sedation). Review of her medical record shows that she received reasonably ordinary general anesthesia, with a potent inhaled agent, nitrous oxide, and fentanyl. For her MAC case, she received intravenous boluses of midazolam and fentanyl. After both anesthetics, she recalls experiencing significant pain but could not tolerate oral opioids prescribed for her. She is motivated to avoid general anesthesia and would like you to develop an anesthetic plan that reduces her risk of excessive somnolence and nausea. She is otherwise healthy, exercises regularly, does not smoke or drink and takes no medication regularly. She has fasted overnight.

- *The surgeon believes that she can perform the procedure under local anesthesia plus intravenous sedation (MAC). What drugs will you select for sedation?*
- *What strategy will you follow to control her pain?*
- *What strategy will you follow to avoid postoperative nausea?*

## Chapter 8 Case Study

You are seeing a 64 year-old man in the preop clinic. He is to undergo an open suprapubic prostatectomy a week from today. His past medical history is notable for an inferior non-q wave MI 2 years ago. He was managed at that time by placement of a bare-metal stent. He has smoked a pack of cigarettes a day for 35 years and sometimes gets shortness of breath during exertion, in cold weather, and when he has a URI. He has had hypertension for many years. Five years ago he was diagnosed with type 2 diabetes mellitus. He works as a carpenter, carrying boards

around the job site, and he does his own yard work. His medications at present are aspirin 81 mg once per day, atenolol 100 mg daily, metformin, exenatide (Byetta), as well as an albuterol inhaler and sublingual nitroglycerin as needed.

- *What ASA physical status class is this patient?*
- *How would you assess his risk and prepare him for surgery from a cardiovascular standpoint?*
- *How would you assess his risk and prepare him for surgery from a pulmonary standpoint?*
- *He asks you if he should quit smoking before the surgery. How would you respond?*
- *How should his diabetes be managed for surgery? Would your recommendation be different if he were taking insulin?*
- *What other information would you like to obtain to complete your preoperative evaluation?*

## Chapter 9 Case Study

You are preparing to anesthetize a 50-year-old man for abdominal hernia repair with mesh. He is 68 inches tall and weighs 260 pounds. He has a full beard and mustache. He has no other major comorbidities. He underwent general anesthesia 20 years ago for arthroscopy of his knee and is not aware of any problems with the anesthetic. You are planning general endotracheal anesthesia.

- *What factors in this patient worry or reassure you regarding his airway management?*
- *How will you further assess his airway?*
- *You decide to proceed with induction of anesthesia. After administering propofol you attempt mask ventilation. You find it difficult to obtain a good mask fit and mask ventilation is difficult. How will you proceed?*
- *You are now successfully ventilating the patient. You administer rocuronium to facilitate intubation. After ventilating the patient for 3 minutes, you perform direct laryngoscopy with a Macintosh 3 blade. You can only visualize the tip of the epiglottis. How will you proceed?*
- *Your initial efforts are still yielding only a view of the epiglottis. You decide to use an alternative airway device to assist you. What are some of your options?*

## Chapter 10 Case Study

You are working with your attending on a busy day. She tells you to go set up the room for your first case. You are familiar with the preparation of the airway equipment and have previously discussed the drugs you will be using. As you

walk towards the OR, your attending calls out to you to “remember to check the anesthesia machine.” You walk into the OR and discover to your dismay that the machine is an older model that does not feature an automatic machine checkout like the more modern ones that you have been using. (Note that this case will be easier if you have read the supplemental Internet material referenced in the chapter).

- *You begin by inspecting the hoses attached to the machine from the gas outlets on the wall. How can you tell if they are properly connected and functional?*
- *How can you tell if you have adequate backup gas supplies should the hospital supply fail?*
- *How can you test to make sure the machine will prevent administration of a hypoxic gas mixture?*
- *Later you are doing the case, which began uneventfully. The patient is intubated and being mechanically ventilated. You note on the capnograph that there appears to be inspired CO<sub>2</sub>. Given your understanding of the anesthesia machine, why might this be occurring (see figure 10.2)? Which of the causes should you have been able to pick up during the machine checkout?*

## Chapter 11 Case Study

[Editor’s note: this case is primarily about monitoring, though figuring out the entire scenario will require your knowledge from other chapters].

You are providing anesthesia for a healthy young woman having a laparoscopic tubal ligation, your last case of a busy day of short gynecology cases. You induced anesthesia with propofol and succinylcholine and artfully intubated the woman’s trachea. You have maintained anesthesia with sevoflurane and fentanyl. The case is now over and you are preparing to wake the patient up. You have discontinued sevoflurane, increased oxygen flows, and have expected to see the patient open her eyes by now. She remains apneic (ventilator dependent, no spontaneous respirations), unresponsive to verbal stimuli, and does not react when you suction her mouth. Your attending comes into the room and asks you why you’re not already on your way to the PACU.

- *How do you know she is apneic? Which monitors can verify this for you?*
- *You conclude that the patient is indeed apneic. Two minutes into your examination, the pulse oximeter shows the saturation to be 99%. How is this possible? Do you suspect a malfunction?*
- *How can you tell if you have allowed enough time for the anesthetics to be eliminated?*

- *Although you believe that enough time has indeed elapsed, you would like to confirm whether or not she is “asleep.” What other monitors can help you?*
- *On the basis of these investigations, you are convinced that the patient’s anesthetics have been eliminated, and that she is not anesthetized. What else might explain her failure to awaken? What monitor could help you verify the diagnosis?*

## Chapter 12 Case Study

A 78-year-old ASA III male with a Mallampati class III airway presents for a cerebral angiogram due to a recent episode of severe headache and transient neurological deficit. He has a history of stable coronary artery disease, poorly controlled hypertension, hyperlipidemia and type II diabetes mellitus. He is a former heavy drinker and smoker but quit both last year. He has no known drug allergies and takes atorvastatin, lisinopril, metoprolol and rosiglitazone (Avandia). You plan monitored anesthesia care (MAC).

- *The case will be done in the angiography suite, not the OR, and you plan MAC, not general anesthesia. How will this alter your anesthetic equipment set up?*
- *What drugs will you select for the case?*
- *After imaging the patient, the radiologist discovers an aneurism and small intracerebral hemorrhage and wishes to coil embolize it to prevent further bleeding. She requests that you alter conditions to completely immobilize the patient for the procedure. What are your options?*
- *Suppose you select general anesthesia. How will you induce and maintain anesthesia? Do you need to intubate the patient and control ventilation?*
- *How will you monitor the patient after you induce general anesthesia? Will your plan change, relative to the monitored anesthesia care phase of the case?*
- *How do your recovery (PACU) plans change with the decision to change to general anesthesia?*

## Chapter 13 Case Study

A 58 year old man is to undergo right total knee replacement (TKR). After a thorough H&P and consultation, he elects to have the procedure under regional anesthesia. He is otherwise healthy, though he smokes a pack of cigarettes a day and does not exercise regularly due to his arthritic knee. He takes a NSAID daily for pain and lately has been taking oxycodone and acetaminophen for worsening pain.

- *Which dermatomes or nerves will you need to block to perform a total knee replacement comfortably?*

- *Which regional anesthetic techniques are suitable for total knee replacement? Which will you choose?*
- *If you choose epidural analgesia, how will you locate the epidural space? What precautions will you take to avoid toxicity?*
- *After verifying proper position of the epidural catheter, what drugs will you use?*
- *Will you continue to use your epidural after the procedure?*

## Chapter 14 Case Study

A 25-year-old otherwise healthy woman is to undergo radical resection of a pelvic sarcoma with prosthetic reconstruction to attempt to salvage the hip joint and thigh. The surgeon estimates blood loss will be 2-5 liters, depending on the findings at operation and extent of major vascular involvement. The estimated surgical time is 6 hours. She has a peripheral 14 G IV, a three-lumen central venous catheter in the right internal jugular vein, and a 20G right radial arterial line. She has 4 units of packed red cells available. She weighs 60 kg. Her preoperative hemoglobin and hematocrit are 12 and 36 respectively. She has fasted overnight and is scheduled for the first case in the morning.

- *How will you estimate her basic fluid requirements for the case?*
- *How low will you let her hemoglobin drop?*
- *What is her acceptable blood loss?*
- *How will you assess and correct other blood product requirements?*
- *What options do you have for reducing transfusion requirements?*

## Chapter 15 Case Study

A 35 year-old woman comes to the OR for emergency laparoscopic resection of a ruptured ectopic pregnancy. She was admitted to the emergency department with abdominal pain and was found to have a positive beta-HCG, a mass on abdominal ultrasound in her right Fallopian tube, and an empty uterus. Her last menstrual period was approximately 8 weeks ago. She states that she is otherwise healthy. She ate dinner approximately 4 hours ago but had little appetite at the time so states that it was “just a little.” She has a 20 G antecubital IV in place, which is slowly infusing lactated Ringer’s.

- *Is the existing IV sufficient for this case? How will you decide whether or not you need better IV access?*
- *Exhaustive search for other veins yields no obvious prospects for additional access. The patient states that she has always been “a tough stick.” How will you proceed?*

- *You plan a rapid sequence induction with propofol and succinylcholine. 60 seconds after injecting propofol, the patient has not lost consciousness. You have not yet injected succinylcholine. How will you proceed?*
- *Can you induce anesthesia by inhalation instead?*
- *You decide that you will need another IV to proceed. What options do you have to establish access?*

## Chapter 16 Case Study

A 52 year-old man is undergoing proctocolectomy for rectal cancer. He was admitted this morning for the operation after undergoing a bowel prep at home the day before. Anesthesia was induced with thiopental and vecuronium and intubation was uneventful. You have placed a peripheral IV, a right internal jugular central line, and a right radial arterial line. You are infusing cefazolin prior to incision.

- *Five minutes after induction, the blood pressure has decreased to 82/50. What is the differential diagnosis? What will your initial steps be to manage his blood pressure?*
- *Your intervention is successful and the case begins. The patient develops tachycardia in the first few minutes. What is your differential diagnosis and initial response?*
- *The patient's hemodynamic status has stabilized and the case is proceeding. Fifteen minutes later the patient's oxygen saturation begins to decrease and is now 90%. The patient is breathing 50% oxygen and 50% air by volume controlled ventilation. What is your differential diagnosis? What will be your response?*
- *Your initial response to hypoxia has raised the saturation to 92% on 100% oxygen. Auscultation of the lungs reveals bilateral wheezes on exhalation. What steps will you take?*
- *Wheezing resolves but the patient develops tachycardia and ST segment depressions. How will you respond?*

## Chapter 17 Case Study

A 48 year-old woman presents for resection of extensive rectal hemorrhoids. She first developed the condition during pregnancies in her late 30s and now has had unremitting symptoms of pain, itching, and occasional bleeding. Her surgeon also plans to perform a “tension free vaginal tape” (TVT) procedure for moderate stress urinary incontinence. She has a history of rheumatic heart disease and has had progressively worsening mitral stenosis. She takes digoxin and a baby aspirin daily.

- *How will you assess the severity of her mitral valve disease?*
- *You conclude that she has moderately severe mitral stenosis with moderately reduced systolic function. What are your hemodynamic goals for the perioperative period?*
- *Her cousin had a very similar procedure performed recently and had spinal anesthesia. She had spinal anesthesia herself for a cesarean section and was very pleased with it. She asks you if she can have this form of anesthesia for her current procedure. How will you respond?*
- *Does she need antibiotic prophylaxis?*
- *You decide to administer general anesthesia. What drugs will you avoid? Which will you choose?*
- *What other special precautions will you take in the intra- and post-operative periods?*

## Chapter 18 Case Study

A 20-year-old male is attending a company picnic. After lunch, the attendees play softball. Your patient is struck in the head by a hit ball. He immediately loses consciousness and paramedics are called to the scene. He is transported to the hospital where a CT scan shows an acute subdural hematoma requiring surgical evacuation. He is awake but confused and sluggish and does not respond appropriately to verbal commands. He does withdraw purposefully to painful stimuli. He does not have any other injuries. His friends tell you he has “never been sick a day in his life.” He is 6 feet, 185 pounds. BP 185/90, HR 55, SpO<sub>2</sub> 96% on room air.

- *Do you believe his intracranial pressure (ICP) to be elevated? What signs, symptoms, or tests can help you decide? Does it matter when deciding how to induce anesthesia?*
- *What determinants of ICP can you influence prior to induction? Will you lower his blood pressure prior to induction?*
- *What other considerations are there in deciding how you will induce anesthesia?*
- *Given all of the above considerations, what drugs will you choose for induction of anesthesia?*
- *What will you do if you are unsuccessful in intubating him?*
- *Once you have successfully induced anesthesia and secured the airway, what anesthetic considerations do you have for the remainder of the case?*

## Chapter 19 Case Study

A 30 year-old otherwise healthy woman presents at 39 weeks gestation with elevated blood pressure for induction of labor. You are consulted when she is 4 cm dilated, contracting regularly, and requesting labor analgesia.



- *What other information will you seek during your preoperative interview?*
- *Your preop shows that she is pregnant with her first child and has intact membranes. Her platelet count is  $165 \times 10^9/L$ . Other laboratory studies are negative. Her previous medical history is negative and her anesthetic history is unremarkable. Her blood pressure on admission was 150/90 and has remained stable. The FHR shows a reassuring pattern. What is your anesthetic plan?*
- *You select epidural analgesia. Describe the technique and your initial choice of drugs?*
- *How will you maintain analgesia once established?*
- *After three hours, you are paged because the patient is experiencing discomfort in the perineal area. She has tried pushing the PCEA button. How would you respond?*
- *The patient has reached full cervical dilation and begins pushing. Shortly thereafter, you are paged urgently because of decelerations noted on the FHR tracing. What are your immediate steps?*
- *Vital signs are normal and the patient is comfortable, but the FHR tracing does not improve. The obstetrician wishes to perform a cesarean section. How do you extend the epidural block for the operation?*

## Chapter 20 Case Study

A 38 year-old female is scheduled for laparoscopic Roux-en-Y gastric bypass. She is 5 feet, 6 inches tall and weighs 300 pounds. She has tried various diet and exercise plans to lose weight without success. She has hypertension treated with an ACE inhibitor. She wheezes on exertion or in hot weather and uses an albuterol inhaler as needed. She snores loudly while sleeping but has not had a formal sleep study and is not interested in CPAP at home due to a poor experience related by a friend. She does not exercise regularly but she is able to walk on level ground for a few minutes at a time in her work as an office postal worker. She has been told she has “borderline diabetes” but is not currently taking any medication for it. Preoperatively, her examination shows BP 180/95, HR 90, RR 24, scattered end expiratory wheezes which clear with cough, airway Mallampati class II, thyromental distance 4 fingerbreadths.

- *How severe is her obesity? Does it matter? Can any other obesity measures help you characterize her health risk further?*
- *What concerns do you have about her respiratory status? How will these impact your anesthetic plan?*
- *How will you monitor her during the anesthetic? Will your plan differ from a normally proportioned patient having laparoscopic surgery?*

- *How will you induce and maintain anesthesia?*
- *How will you manage postoperative pain? Would your plan differ if the procedure were an open Roux-en-Y?*

## Chapter 21 Case Study

A 68 year-old man has symptoms of benign prostatic hypertrophy and is to undergo transurethral resection of the prostate (TURP). He has hypertension and hyperlipidemia and takes an ACE inhibitor and atorvastatin (Lipitor). He is physically active and has no symptoms of angina or heart failure.

- *What else will you investigate in the preoperative assessment?*
- *Will you recommend regional or general anesthesia? What are the relative merits of each?*
- *After discussion with the patient, you decide on general anesthesia. How will you induce and maintain anesthesia?*
- *The procedure takes longer than expected due to a very large amount of prostatic tissue requiring resection. At the end of the operation, you extubate the patient and take him to the PACU. He is hypertensive, confused and agitated. How will you assess him?*
- *If you believe he has TURP syndrome, how will you treat him?*

## Chapter 22 Case Study

A five year-old boy has been vomiting and had little or no appetite for two days. He has taken limited amounts of liquids by mouth. He has now developed abdominal pain and is suspected of having acute appendicitis. The surgeons plan a laparoscopic appendectomy. The child is a healthy product of a full-term delivery. Vital signs are HR 120, BP 95/50, RR 24.

- *How will you assess his volume status prior to surgery? What metabolic derangement would you suspect him to have?*
- *The child is anxious and teary. How can you help during the preparation for and induction of anesthesia?*
- *Would you perform an inhalation or intravenous induction?*
- *If you decide on an intravenous induction, how can you facilitate placement of the IV in this frightened child?*
- *How will you induce and maintain anesthesia? What size endotracheal tube will you use?*
- *How will you know when you are able to extubate the patient at the end of the procedure?*

## Chapter 23 Case Study

An 82 year-old female suffered a fall, fractured her right hip, and is to undergo open reduction and hemiarthroplasty. She has no other injuries and did not lose consciousness. She is a smoker with a 60 pack-year history, but currently smokes just 2-3 cigarettes per day. She has chronic hypertension and an electrocardiogram from last year showed a right bundle branch block and a left anterior hemiblock with a sinus rhythm and rate of 55. She is a retired professor of pathology, a medical school dean, and still serves on your hospital's faculty council on promotions. She is in mild-moderate pain, which is much worse with movement of the right leg. She has expressed some concern regarding the effects of anesthetics on postoperative cognitive function.

- *What preoperative assessment will you perform before deciding on an anesthetic plan? How would it differ from the preop you'd perform if the patient were having an elective cataract surgery?*
- *How will you address her concern about postoperative cognitive dysfunction?*
- *Will you favor regional or general anesthesia?*
- *Will you premedicate the patient prior to anesthesia?*
- *If you and the patient agree on regional anesthesia, what type will you perform?*

## Chapter 24 Case Study

A 20 year-old woman is scheduled for breast augmentation surgery. She attends college and works part time as a waitress and in the college library. She is strongly motivated to have the procedure performed as an outpatient and to return to work and minimize her time away from school and work. She is generally healthy, though she notes that she has seasonal allergies and occasional wheezing for which she takes an antihistamine and uses a metered dose inhaler (albuterol) as needed. She does not smoke, drinks alcohol on the weekend (3-4 drinks once per week), and does not use recreational drugs. She takes oral contraceptives and also has a history of motion sickness.

- *Is it appropriate to do this case in an outpatient surgery center? What other information do you need to decide?*
- *Is she at high risk of postoperative nausea and vomiting (PONV)?*
- *How will you induce and maintain anesthesia?*
- *How will you manage postoperative pain?*
- *How will you reduce the risk of PONV?*
- *Anesthesia and emergence are uneventful and you take the patient to the PACU. When can she go home?*

## Chapter 25 Case Study

A 23 year-old male was an unrestrained driver in an automobile crash in an older car without airbags. He and his friends had recently left a party where he had consumed “a couple of beers.” He hit the steering wheel on impact and has multiple contusions on his chest and complains of chest pain with respiration. His left shoulder is dislocated. He also has a broken tibia and is suspected of having a splenic injury. He did not lose consciousness at the scene. His breath smells of alcohol and he is snoring loudly. He awakens with vigorous shouting and is somewhat combative and confused. He complains of pain in the affected injured area when examined and can move all four extremities on command. He is an otherwise previously healthy college student.

- *What is his Glasgow Coma Scale score?*
- *The patient arrives from the emergency department with two upper extremity peripheral IVs in place infusing room temperature lactated Ringer’s. Do you need additional access? How will you modify the resuscitation strategy in the OR?*
- *Studies of the aorta have led the surgeons to observe rather than operate for this injury. The cervical spine was found free of fractures or dislocations on head and neck CT scan. The patient is still wearing a cervical collar placed at the scene. He does not complain of neck pain. Can you now remove it prior to facilitate management of the airway?*
- *The patient has not consumed solid food for eight hours and last drank liquids more than 2 hours ago. How will you induce anesthesia and secure the airway?*
- *What other goals will you have during anesthesia for the case?*

## Chapter 26 Case Study

A 32 year-old woman seeks consultation with you in the pain management clinic. Six months ago she sprained her left elbow and wrist in a fall while roller blading. After recovering uneventfully with splinting of her wrist and wearing a sling for four weeks, she has developed severe pain again. She describes it as burning and constant. She describes tingling, “electric shock” sensations over the affected area. It covers the dorsum of her hand, both sides of her forearm, and the posterior aspect of the elbow and lower arm. She notes that she cannot type with her left hand and that she cannot lift her backpack with her left arm. She finds showering painful and keeps the arm out of the water; she avoids long-sleeved shirts because the fabric rubbing against her skin is painful. On examination the limb is purplish and mottled, edematous, and cool to the touch. There is less hair than on comparable regions of her right arm. The nails

of her left hand are thickened, discolored, and longer than those on her right. Lightly stroking the dorsum of her hand with a fingertip causes pain.

- *You perform the initial evaluation with your attending. You are asked to dictate the note describing the patient's pain presentation. Which of the four main types of pain will you characterize hers as?*
- *Which pain descriptors will you use to describe her symptoms?*
- *What is your working diagnosis? How could you verify it?*
- *What treatment would you offer her?*

## Chapter 27 Case Study

A 45 year old woman has just undergone total abdominal hysterectomy. She is generally healthy, does not smoke or drink alcohol, and has not had general anesthesia ever before. She emerged from general anesthesia (thiopental, vecuronium, sevoflurane, fentanyl) uneventfully. You accompany the patient to the PACU, assist the nurse with settling the patient, and obtain initial vital signs on arrival: BP 148/90, HR 77, SpO<sub>2</sub> 98% on facemask oxygen at 6 L/min.

- *Describe the elements of the report you will now give to the PACU nurse.*
- *After completing your report you leave the bedside to complete your paperwork. Before you return to the operating room, approximately 5 minutes after your initial arrival in the PACU, the nurse calls you back to the bedside. The patient is agitated, thrashing around in bed and not answering questions or following instructions to lie back and relax. What will be your initial steps in assessing the patient? What is the differential diagnosis?*
- *You exclude emergencies and conclude the patient is experiencing emergence delirium. How will you respond?*
- *The patient improves. One hour later you are called back to the PACU. The patient is complaining of pain. How will you assess the patient? What intervention will you recommend? Would your approach be different if the patient had undergone laparoscopic myomectomy and was scheduled to be discharged home later today?*
- *The pain is under control 30 minutes later but the patient now complains of nausea. How will you respond?*
- *When can the patient be discharged from the PACU? How would your criteria differ if the patient were being discharged home after laparoscopy instead?*

## Chapter 28 Case Study

You are called to the PACU emergently to see a 57 year old patient who has just undergone an aorto-bifemoral bypass graft. On arrival at the bedside, the nurse

informs you that the case proceeded uneventfully and the patient arrived in the PACU one hour ago. The patient underwent general endotracheal anesthesia and was extubated in the OR. Vital signs on arrival had been normal, but the blood pressure had been progressively declining and heart rate had been rising since then. Five minutes ago, the patient's blood pressure had been 68/40 and heart rate 128. Now the nurse notes she cannot obtain a blood pressure and cannot feel a pulse. The patient has a peripheral IV infusing lactated Ringer's and an arterial line in the right radial artery. No blood pressure is seen on the arterial tracing.

- *What will be your initial response (first 30 seconds) on arrival?*
- *The patient is found to be apneic and pulseless. What will you do next?*
- *The patient is found to be in ventricular fibrillation. What will you do next?*
- *After your initial intervention, sinus rhythm reappears. Inspection of the arterial tracing shows minimal pulsatile activity, and manual blood pressure measurement confirms that the blood pressure remains unobtainable. What are your next steps?*

## Chapter 29 Case Study

Peter is your favorite anesthesiology resident. He is amazingly confident, skillful, and aggressive. He loves “big” cases and always volunteers for trauma, cardiac, or messy “whomps.” You’ve seen him at a couple of social events, and he is the life of the party, joking with everyone, positively lighting up the room. He drives a sports car, regales his friends with stories of his travel adventures, and dates a model. He recently took up skydiving and is working on his private pilot’s license. But he is also amazingly generous. He has covered other residents’ call several times, and he offers to stay late and finish late cases so others can go home. Today, you witnessed an event that seemed totally out of character. One of his assigned cases, one of those big cases he loves, was moved to another room because the first case in his room was running late. He was irritable as he dropped off his patient in the PACU. Then he sought out the floor leader and lambasted him (an attending with 20 years of seniority) for “taking my case away.” Then he sought out the resident in the room where the case was transferred and demanded to switch assignments (they had put a breast biopsy in his room). This resident had already begun working with the patient and refused. Peter told the patient that he was more experienced and a better anesthesiologist than the resident now assigned to him, and asked the patient if he wouldn’t prefer Peter as his anesthesiologist. The frightened patient was